THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. JULY 4, 1895. CHICAGO, ILL. NUMBER 27.

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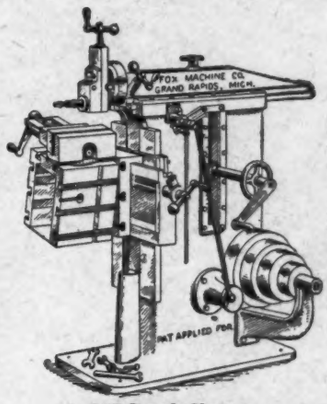

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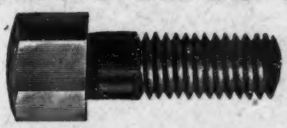

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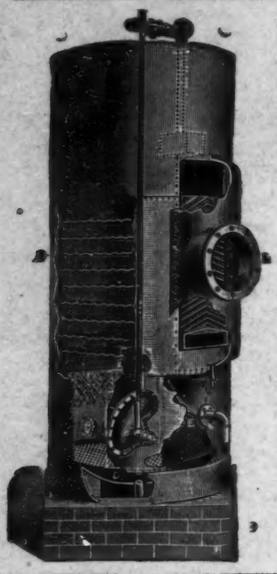

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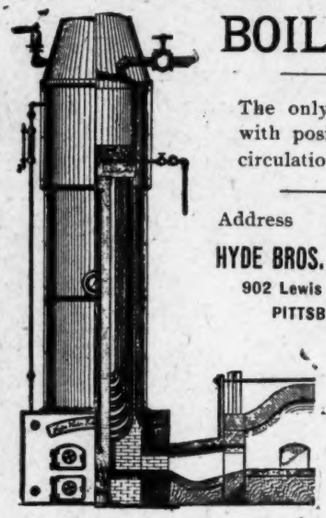

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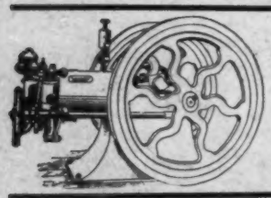

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. JULY 4, 1895. CHICAGO, ILL. NUMBER 27.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

With all wage scales settled, the iron trade enters upon the second half of the year with prospects of the heaviest summer output in years. Structural mills, plate and bar mills, East and West are well supplied with orders and rail mills have a tonnage before them that is in decided contrast to their beggarly orders a year ago. The settlement of the bar iron scale has brought with it the announcement of an advance to 1.20c for common iron at valley mill. Sixty days of this new basis —and the probabilities are that the price may be higher before that time—will give the puddlers an advance to $4.25 by Sept. 1 and thus their demand has been met half way before they have had time to organize the threatened seceding movement. Two Pittsburg non-union mills, moreover, have already announced a $4.25 rate. Another advance, this time of $1 a ton, has just been made by Southern furnaces, and it carries with it a higher wage for labor at the mines of the producing companies. The present Birmingham basis is $8.75 for gray forge, $9.75 for No. 1 and $9.25 for No. 2. There was a rush in some quarters to place orders at the former price, just after the advance came, but the new price is already established by sales. A few Southern furnaces about to resume after long inactivity will add about 1,500 tons to the active weekly capacity. Charcoal irons have not shared with the product of coke furnaces in the recent advances, and strange as it may appear, there have been a few sales of Lake Superior charcoal to take the place of coke iron because of the higher price of the latter. While sales in the Chicago district and some in districts reached from Buffalo have shown an advance of 50 cents in Lake Superior charcoal, others are reported at a figure fully as low as any yet reached. Bessemer pig and billets continue to advance and the scarcity of steel is being emphasized with every week, no indication appearing that the upward movement is to be interrupted. The high price has cut off Eastern buying from Pittsburg and Wheeling steel companies but most of the latter have their output, above their own requirements, taken for from three to six months. Sales of the week have been made at $20 to $20.50 for deliveries in the third quarter, and a sale is reported at $20.75 Pittsburg. The contract recently closed for billets to be converted into rods at Cleveland for a Western steel interest whose output of rods is not equal to the demand in its territory, was placed in the valley for the most part. The bulk of the 19,000 tons involved will be delivered in Cleveland in the next six months at $19.25. A sale of 1,500 tons of billets is reported at $19.85 Cleveland. Quite liberal sales of Bessemer pig have been made at from $12.40 to $12.80 valley furnace in the past week, making an advance of $3.60 on that metal from the lowest point. Makers now hold for $13 and $13.25. The week has strengthened plate, sheet, rod and structural mills in the independent position which many of them have occupied for the past month. Prices for all these products are very firm and the demand continues strong.

THE CLEVELAND DISTRICT.

An unprecedented movement of ore to July 1 is shown by the figures for shipments from upper lake ports. The amount through the Soo up to July 1 was 2,268,484 gross tons, and in June alone 1,329,991 tons, the largest June record in the history of the canal. From Escanaba and Gladstone, the official figures to June 1 showed a total of 508,836. The June movement from these two ports is not far from this amount, so that a close estimate of the total from all upper lake ports to July 1 would be in the neighborhood of 3,300,000 gross tons. To July 1, 1894, the exact total was 2,505,412 gross tons, showing an increase of nearly 800,000 tons. The freight market has been firm the past week and in the case of a few cargoes of Mesabi ore not represented by a Cleveland agency 90 cents was paid from Duluth, but shippers generally are refusing to pay more than 85 cents. The result has been that Duluth docks are crowded with ore, light vessels preferring to make the shorter run to Ashland. A sale of 35,000 tons of ore for Bessemer mixture is reported at a 10-cent advance. It has now come to the point at which several furnacemen are trying in vain to increase their purchases of standard Bessemers and are compelled to take ores higher in phosphorus to mix with low phosphorus ores already bought.

Pig Iron. A 6,000-ton sale of Bessemer at $12.75 valley furnace early in the present week and a sale at $12.35 in the latter part of last week represent about the week's advance in that metal. A transaction at $12.80 in the valley is also reported, and furnaces are asking $13 and $13.25, with inquiries still freely made. The majority of valley furnaces are sold for the third quarter and some have little iron to sell for delivery before Jan. 1. A few producers have sold only moderately and are able to get the benefit of successive advances. Foundry furnaces are well sold ahead and are making deliveries of their metal as fast as it is made. Buyers seem anxious to contract, and not a few are trying to place orders for six months ahead at present prices. Sellers are holding off on such business and are aiming to keep the trade in closer range. No. 2 iron is growing scarce and some sellers are out of the market on that grade. Sales have been made at $11.50, while $12 in the valley is asked for No. 1. Lake Superior charcoal, notwithstanding the current output is at the lowest point in years, is strangely weak in spots, quotations of sellers varying as much as $1.50 a ton. Sales are reported from $12 up to $13.50 Buffalo. The coke basis is established at $1.35 a ton, with a proviso that an advance of one cent per 100 bushels for mining shall carry two cents advance per ton of coke. Contracts have been taken below this—even below $1.20, as heretofore stated—but the bulk of the business is at the above figure.

Finished Material. The advance in bar iron to 1.20c Cleveland has made no interruption in demand. Sellers, moreover, are refusing to book business far ahead on this basis and indications point to higher prices

Continued on page 6.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The principal item of interest in the past week was the advance of $1 a ton on Southern pig iron. This advance was rather in the nature of a surprise, as one had been looked for but it was hardly supposed that it would be larger than 50c. Crude iron has sold well in the last week and the inquiry continues very large. Bars are in good demand but the mills are apparently not very anxious to take further orders to any great extent. The price has been advanced $2 a ton. Rails are in large demand and good sales have been made. No sales of billets were made last week but several hundred tons of sheet bars were sold and a round lot of rods. Prices are higher on all of this material. Orders for structural material and plates are still plentiful and some of the principal mills are short on certain shapes. Other classes of material are selling well and are quoted very firm.

PIG IRON.—The sale of local iron last week fully equaled that of the week before and the demand does not seem to be falling off at all. Two of the local furnaces are at present out of the market, and make either no quotations or higher than the market. The tonnage of the last week was divided up into small lots, with no very large single sales. Quotations are very firm. Southern iron had a larger sale than for several weeks past and three or four round lots were taken. Prices were advanced a dollar a ton on all grades, and as soon as this fact became known buyers rushed into the market endeavoring to get their orders placed at the old rates. Some of these were successful but most of the furnaces refused to take orders except on the advanced basis. This advance was at least twice as large as had been expected by any one. It hardly seems probable now that any further advance will be made for some time to come. Lake Superior charcoal iron sold well in the last week, although no particularly large single sales were closed. Quotations are revised as follows:

Lake Sup. Charcoal	$13 25@13 75	Southern No. 2 Soft	$12 25@12 50
Local Coke Fdy. No. 1	12 00@12 25	South'n Silveries No. 1.	13 75@14 00
Local Coke Fdy. No. 2	11 50@11 75	South'n Silveries No. 2.	13 25@13 50
Local Coke Fdy. No. 3	11 00@11 25	Jackson Co. Silveries	15 00@16 00
Local Scotch Fdy. No. 1.	12 00@12 25	Ohio Silveries No. 1	14 00@14 50
Local Scotch Fdy. No. 2.	11 50@11 75	Ohio Silveries No. 2	13 00@13 50
Local Scotch Fdy. No. 3.	11 00@11 25	Ohio Strong Softeners	13 00@13 50
South'n Coke No. 2	12 50@12 75	Alabama Car Wheel	16 50@17 00
South'n Coke No. 3	12 25@12 50	Malleable Bessemer	12 00@12 50
Southern No. 1 Soft	12 50@12 75	Coke Bessemer	12 00@12 50

BARS.—A number of buyers were in the market last week for round lots of iron and the aggregate of sales closed was quite good. Prices were advanced at a meeting of the Bar Iron Association held in Youngstown on Thursday of last week, $2 a ton. Several of the mills are entirely out of the market, or are so well sold up that they are asking figures even in advance of these. Quotations are now made as follows: Common iron, 1.30c to 1.40c; guaranteed iron, 1.40c to 1.45c; soft steel bars from strictly billet stock, 1.45c to 1.50c.

RAILS AND TRACK SUPPLIES.—Orders have been quite large, and the total tonnage closed has been very satisfactory. Inquiries continue very large and it is probable that a good business will continue to be done. The local mills are sold up until the first of October. Quotations on rails are unchanged, but track supplies are advanced and are as follows: Rails, $25 to $27; splice bars, 1.50c to 1.55c; track bolts, 2.05c to 2.10c; spikes, 1.85c to 1.95c.

BILLETS AND RODS.—No sales of billets were made in the past week, but quotations have been advanced and are now made at $22.50 to $23. A few round lots of sheet bars were sold in this market by Eastern mills at $25.50. The local mills are sold up. A sale of 1,000 tons of rods was made last week at $28 for August and September delivery by the local mills. The Joliet Works of the Illinois Steel Co. are shut down for repairs made necessary by an accident, and will probably be closed for a week or ten days.

STRUCTURAL MATERIAL.—The contract for 1,700 tons of material for the Winnebago Building was given out last week. Aside from this no other large orders were placed, but general business is excellent and appears to be increasing. An order for the material for some bridges was placed by the C. & E. I. Road and another railroad will be in the market this week for 300 or 400 tons. Quotations are as follows: Beams and channels, 1.70c to 1.80c; angles, 1.60c to 1.70c; plates, 1.75c to 1.85c; tees, 1.75c to 1.85c. Small lots from stock are quoted at from ¼c to ½c higher.

PLATES.—No business of especial note was placed in this market last week, but the general inquiry is quite large and the total tonnage closed was very satisfactory. The inquiry noted last week for 1,000 tons of tank plates received from a Detroit car works was placed in the East. Quotations are unchanged and are as follows: Tank steel, 1.70c to 1.75c; flange steel, 1.90c to 2c; fire-box steel, 2.10c to 5c.; boiler tubes, 70 and 5 to 67½ per cent discount.

MERCHANT STEEL.—The regular trade has been large and several good orders were placed. Some season contracts came up for consideration but were not placed as buyers were not satisfied with the prices given them. It is probable that they will be placed in the immediate future. Quotations are made as follows: Open-hearth spring, tire and machinery steel, 1.90c to 1.95c; smooth finished machinery, 1.75c to 1.80c; smooth finished tire, 1.65c to 1.75c; Bessemer bars, 1.55c to 1.60c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SHEETS.—The inquiry for black sheet iron has been large, but the mills are not at all anxious to sell. A large number of mills are sold up and others are so well filled with orders as to be very independent. Prices are made at 2.60c and 2.70c for No. 27 common iron; 2.70c to 2.80c for sheet steel. Galvanized iron is in good demand and is now selling at 75 per cent discount.

OLD RAILS AND WHEELS.—No business has been done in old material and prices remain unchanged. They are made as follows: Old iron rails $13.75 to $14.25; old steel rails $9 to $9.50 for short, and $11 to $12 for long lengths; old wheels, $11.50 to $12.

SCRAP.—A few good-sized transactions were reported last week, but the general market is quiet as consumers do not seem able to pay the high prices. Quotations are made as follows: Railroad forge, $11; dealer's forge, $9.50; No. 1 mill, $8.25 to $8.75; heavy cast, $8.25 to $8.50; axles, $14.75 to $15; cast borings, $4.75; wrought turnings, $6 to $6.25; axle turnings, $6.75; mixed steel, $8 to $8.25; stove plates, $6; heavy melting steel, $9.50 to $9.75.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. There is one labor conference yet to be held —that with the bar iron manufacturers, appointed for Monday, July 8; but now that the valley and Western bar iron scale has been settled it is not expected there will be any difficulty in agreeing to $4 puddling, and a 1.1c base, especially since the Oliver and Lockhart mills are paying $4.25. The advance in bar iron decided on at Youngstown will be followed here, though Pittsburg manufacturers are not in the association. Prices the past

week have been 1.10@1.15c for common iron. On steel bars 1.20c@1.25c, with the new extras, is the range of current transactions. The Bessemer pig market has shown continued activity and the last two weeks would indicate that the scarcity both in Bessemer pig and in billets is likely to become more pronounced. Sales of 6,000 tons at $12.40 valley furnace, of 10,000 tons at $12.50, of 5,000 tons at $12.35, of 5,000 tons at $12.75, all at valley furnace are reported for the past week. The $12.75 sale, or $13.40 Pittsburg, was made in the past two days, and that is the market to-day, with some furnaces holding for $13 and $13.25 in the valley. Foundry iron is advancing more slowly, and is sold to-day at $12.50 for No. 1, and $12 for No. 2. A sale of 1,500 tons of gray forge is reported at $10.25 valley furnace. Steel mills are well sold up on billets to the end of the third quarter and some have their excess capacity taken for most of the second half of the year. A part of the Eastern inquiry for steel that has been noted recently has been satisfied by shipments from a Central Pennsylvania steel works The sales in this market and in the Wheeling district have been at $20 to $20.50 the past week, and small-lot sales since Monday are reported at $20.75. The plate, structural and sheet mills are still far behind orders. For beams and channels 1.45c@1.50c are firmly maintained, with building and bridge demand keeping up well. Railroad buying is gradually expanding and car work is responsible for a considerable tonnage from local mills. Sheets are more and more difficult to get in anything like prompt time from the mills; jobbers are better supplied on certain gauges. We quote 2.40c@2.45c for No. 27 steel. Galvanized sheet mills are sold up to fall. Iron and steel skelp has been in large demand and mills are sold up for several months. Plate mills are asking from 1.45c to 1.55c and even higher on reasonably prompt shipments. Old material is steady at the higher prices recently quoted. Old iron rails have sold at $14.50 and $15 a gross ton and No. 1 wrought scrap at $12@$12.25 a net ton.

Cincinnati. In foundry and mill irons the week has been especially active. The demand has been normal and the transactions closed have been on the new schedule of prices, both Northern and Southern. There is a general desire on the part of consumers to cover for long extended deliveries, but this is stubbornly refused by furnace companies who hold to three months deliveries ahead, or if further extended, to 25 cents higher prices. An extended tour through the Mahoning and Shenango Valleys reveals very scant stocks of foundry and mill irons, smaller it is claimed than for years. Taking this in connection with the tendency of the furnaces to go on to Bessemer, because of the heavy demand and high price for that product, the future outlook for foundry and mill irons is better than the present demand. The Valley furnaces are generally holding to the following schedule of prices, cash f. o. b. furnaces: No. 1 foundry, $12; No. 2 foundry, $11.50; No. 3 foundry, $11; gray forge, $10.50. Not many of them, however, have much iron to spare. Just at the close of the week another advance was ordered by the leading Southern producers. It amounts to $1 a ton, and carries No. 1 foundry to $9.75; No. 2 foundry and No. 1 soft to $9.25; No. 3 foundry and No. 2 soft to $9; and gray forge to $8.75 Birmingham. The more conservative among the consumers say that things are going at too rapid a pace and some furnace men take the same view. The latter realize that such advances mean appreciation of cost in every item that goes into pig iron. There is no place, however, for arguments, or considerations of general policy in a rapidly advancing market. The more that sellers hold back, the more eager are buyers to get hold of material, which at lower prices they thought they did not want. There is, however, for the present advance, the strong foundation of reviving prosperity in a country that has been prostrated for several years. There is not the least doubt among experienced and careful observers that full outside prices of to-day will be maintained and it will be strange if there is not further improvement before September. There is quite a way yet to go to come up to what used to be regarded as lowest possible limits, namely, $10 at Birmingham for gray forge and $15 to $16 Pittsburg for Bessemer.

Buffalo. A strong buying movement has continued through the week with orders much heavier than furnace companies like to see. Sellers are strongly disposed to the conservative policy of waiting to see what the future has in store and would much prefer to temporarily retire from the market. But when former customers apply it seems necessary to respond, and the result is order books filled close to the capacity of their plants for months ahead. This market has been slow to advance pig iron prices, and the moving up of figures this week, which actual sales record, is more in the line of following in the steps which other more aggressive fields took some time before. Sales have been freely made at prices fifty cents higher than the schedule of one week ago, and while Lake Superior charcoal was then nominally $13 cash at Lake Erie ports, it is doubtful whether any could be found to day below that as a minimum.

Mr. West on Foundry Power Cranes.

TO THE EDITOR OF THE IRON TRADE REVIEW:

The writer desires to correct the impression which the discussion at the last meeting of the Western Foundrymen's Association conveyed that our power cranes are a lot of old-fashioned, obsolete ones. The cranes cited are but a little over two years old and I will match them with any full power cranes to be found, for rapidity and sensitiveness in their hoisting, lowering and revolving operations. There seems to have been a misunderstanding as to the purport of my letter The meeting was one set aside for questions, and my communication was one simply suggesting a topic which could have opened up a new line for the detailed statement of experiences as to the utility of the different kinds of full power cranes now in use. The good qualities of cranes have been emphasized. What is now most needed is a full and frank ventilation of their bad qualities, and these, I claim, all cranes possess, in a greater or less degree. I doubt if there is a full power crane in existence, in which, if it were to be built over, the users would not desire to have some little different arrangement or improvement made. Then again, every principle involved in a crane has its advantages and disadvantages. The steam crane has the commendable quality of being independent of other machinery than a boiler, to admit of continuity of running. But at the same time it has its objections in other lines, to some of which my letter directed attention. Cranes are continually being improved upon and I had hoped my letter to the Association would have brought out a frank, detailed statement of experiences with the objectionable features and any improvements which might be suggested. We certainly have not attained perfection in all points of power cranes for application to various specialties in the foundry. The sentiment seemed to prevail at the meeting that it was only the good qualities of the crane which should be brought out. Had I thought so, I could have given a letter on our cranes four times as long as the one I sent. As only statements of the good qualities have appeared, I thought the mention of a few of the drawbacks would be of benefit, and I do not think it is to the discredit of anyone to possess the courage to speak of some of them. THOS. D. WEST.

THE IRON TRADE REVIEW

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JULY 4, 1895.

SPECIAL interest attaches to the paper entitled "Keep's Cooling Curves" presented at the Detroit meeting of the mechanical engineers last week, for in it Mr. Keep has not only detailed the results of a series of brilliant experiments, but has opened the way to a practical application of his discoveries to every-day foundry work. Mr. Keep's position relative to the chemist's work in foundry practice has been indicated in his claim that the chemist cannot tell from the analysis of the iron going into the cupola what will be the physical properties of the casting that comes from the mold. And the discussions over chemical and physical tests have all come down to this: that both the physical and chemical analyst can assist in guarding against the recurrence of unsatisfactory results, but since their work is done after the iron has left the cupola, they cannot make the charge just what it should be to guarantee a desired result. Mr. Keep's discoveries concerning the three expansions of iron as it cools in a mold come closer than anything yet developed, to a regulation of the charge with reference to specific qualities in the casting. On this point he says:

> In the practical application of cooling curves to foundry work, the mold can be made in 20 minutes, and as soon as the iron is running the bar can be poured. It takes 15 minutes to find the third expansion. It is at once apparent whether the mixture needs more or less silicon, and the charges of iron can be changed at once, if necessary.

While Mr. Keep's paper is thus far only suggestive of what may hereafter be worked out to something of the definiteness of a formula, yet taken in connection with his contribution of last December, in which he sought to demonstrate that a measure of the shrinkage would indicate whether a cupola mixture needed more or less silicon, it points to the attainment of greater uniformity in foundry operations than thus far has been found possible. It may help the founder to know results before the fact, as the steel maker knows them, instead of merely knowing them after the fact, when there is no remedy so far as the work in hand is concerned.

THE views of Manager Swank reproduced in another column on the outlook for iron and steel prices merit wide reading and careful consideration. The history of the boom of 1879–80, when British iron and steel works made a dumping ground of the United States, when pig iron stockpiles in England long overgrown with weeds contributed to the grand rush, and yards on both sides of the water were bared of long accumulations, will not be repeated; yet there are some products on which the danger line will soon be reached. Home prices as quoted in Mr. Swank's table have advanced since they were originally put in type, and there is not the slightest indication as yet, of a halt in the upward movement. Tin plate manufacturers, in particular, can only regard the advance in steel and the prospect of higher prices with anxiety, unless it should be counteracted by a general advance of wages across the water.

THE advantages of the south shore of Lake Erie as a location for the most economical steel-making are to have more than national recognition. The experts who are to report to the English debenture-holders of the Otis Steel Co. are expected to cover the ground in much detail, in discussing the proposition to erect blast furnaces in connection with the Otis plant. Their report will be awaited with not a little interest.

A NOTEWORTHY feature of the Lake Superior ore trade this year is the increased tonnage sold to Eastern furnaces. This applies not only to low-priced Mesabi ores, but to standard Bessemers, and there is also noted a movement of the better non-Bessemer ores which will go into foundry mixtures. It appears to be the purpose of certain eastern Pennsylvania foundry furnaces to meet the foundry irons of the valleys that have been going into New York markets and into the territory east of the Hudson with irons made likewise from Lake Superior ores. The increased sales of Bessemer ores have been due to the low prices at which they have been available, making those of high iron content competitive with foreign ores even at a 40 cent tariff. There may be a different situation next year, however, with the higher prices Lake Superior Bessemers are sure to bring.

THE CLEVELAND DISTRICT.—Continued from Page 3.

later in the month. Structural mills find no slacking in demand. A Toledo block calling for several hundred tons was let the past week. One Pittsburg mill has advanced prices $1 a ton, making 1.50c the minimum on beams and channels, with a similar advance on angles On plate orders nothing short of 30 days delivery is guaranteed by mills best prepared for prompt orders and 1.50c @ 1.60c Pittsburg is the market for tank steel. Light sheets are unobtainable from mills, for early shipment. Heavy sheets from No. 8 to No. 14 are also in large demand. Boiler steel is in increasing inquiry, boiler works finding an encouraging demand. The plates for the new U. S. revenue cutter to be built by the Globe Iron Works Co., were placed in Cleveland the past week. About 400 tons of plates and shapes are required.

THE Cambria Iron Co.'s last pay was over $100,000, against about $50,000 at the same time last year and less than $50,000 two years ago.

THE Phœnix Iron Works, Phœnixville, Pa., have posted a notice of an advance of 10 per cent in all departments taking effect July 1.

THE Youngstown (O.) Steel Co. has made the first shipment on an order for 1,000 tons of wash metal to go to England.

THE W. Dewees Wood Co., of McKeesport, Pa., advanced the wages of its employes 10 per cent July 1.

THE NEW EXTRAS ON STEEL BARS.

The schedule of extras on steel bars decided upon at the meeting of Pittsburg manufacturers held recently at the office of the Carnegie Steel Co., Ltd., is given in full below. The old range of sizes to which the base price was applied in the practice of several Pittsburg concerns was from 1 to 3 inches inclusive, rounds and squares. The Eastern bar iron card, which some manufacturers used, made base prices apply on sizes from ¾ inch to 2 inches inclusive. In the new list of extras it will be observed, the range is from ¾ to 3 inches:

REGULAR BAR SIZES, NOT EXTRA.

Rounds and squares	¾ to 3 inches.
Flats	1 to 4 inches × ⅜ to 1½ inch.
"	4½ to 6 inches × ⅜ to 1 inch.

ROUNDS AND SQUARES, EXTRA.

	Tenths of a cent per pound.
⅝ and 11-16 inch	1-10
½ and 9-16 "	2-10
7-16 "	4-10
⅜ "	5-10
5-16 "	6-10
¼ and 9-32 "	7-10
7-32 "	1 cent extra.
3-16 "	2 "
3 1-16 inches to 3½ inches	3-10
3⅜ " to 4 "	5-10
4⅛ " to 4½ "	6-10
4⅜ " to 5 "	8-10
5¼ " to 5½ "	1 cent extra.
5¾ " to 6 "	1 5-10 "
6¼ " to 6½ "	2 "
6¾ " to 7 "	2 5-10 "

FLATS, EXTRA.

1 to 6 inches x ¼ and 5-16 inch	2-10
1 x 3-16	4-10
⅝x⅜ to ¾	4-10
⅝x¼ and 5-16	5-10
⅝x3-16	6-10
¾x⅜ to ⅝	4-10
¾x¼ and 5-16	5-10
¾x3-16	7-10
¾x⅜ to ½	5-10
⅝x¼ and 5-16	7-10
⅝x3-16	9-10
½x¼ to ⅜	1 1-10 cent extra.
½x3-16	1 2-10 "
2 inches to 4x1⅝ to 2 inches	2-10
2 " to 4x2⅛ to 3 "	3-10
4⅛ " to 6x1⅞ to 2 "	2-10
4⅛ " to 6x2⅛ to 3 "	4-10

OVALS, EXTRA.

⅝ inch to 1¼ inch	4-10
¾ " to 13-16 "	5-10
⅝ " to 11-16 "	6-10
½ " to 9-16 "	8-10
⅜ " to 7-16 "	1 cent.

HALF OVALS AND HALF ROUNDS, EXTRA.

⅝ inch to 1¼ inch	5-10
¾ " to 13-16 "	6-10
⅝ " to 11-16 "	7-10
½ " to 9-16 "	9-10
⅜ " to 7-16 "	1 1-10

The extras for cutting ordinary bars to specific lengths are as follows: Machine cutting, specified lengths, above 24 in., 2-10 cent per pound extra. Machine cutting, specified lengths, 12 to 24 inches, 4-10 cent per pound, extra. Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 6-10 cent per pound on each size, extra. Machine straightening and centering, 1-10 cent per pound, extra. Shearing, one-half of the above extra for cutting.

Lake Superior Iron Mines.

It is proposed by the Biwabik Bessemer Co., operating the Biwabik mine, to carry out the original plan proposed by John T. Jones, when superintendent of the property, namely to unite the east and west cuts, so as to obviate the necessity of backing cars out. A large amount of earth must be moved and proposals have been asked for taking out 300,000 cubic yards.

The Cincinnati mine adjoining the Biwabik has been opened up again and 100 men will be put at work. The Minnesota Ore Co. is the name of the new company organized to operate the property.

The Mahoning Ore Co. begins shipments this week from its mine at Hibbing, Minn. The ore goes to the Allouez Bay dock at Superior, over the Mississippi & Northern and the Duluth & Winnipeg roads. It is understood that the freight rate to the dock is 60 cents, or 20 cents less than by the other two roads that tap the Mesabi.

The ore movement from Ashland last week was 96,767 tons; for the season, 825,723 tons.

At the Mountain Iron mine two steam shovels are now at work loading ore and upwards of 100 men are employed. It is not expected that any further stripping will be done this season.

The Adams mine at Eveleth, Minn., became a shipper last week. The daily movement will be 2,000 to 2,500 tons. The milling system is adopted. The shaft is 125 ft. deep and 16 ft. 4 in. by 6 ft. 9 in. with two skip roads. At the bottom is a drift 155 feet long which is connected with a raise that goes to the surface and is about 10 ft. in diameter.

The Aragon has about 105,000 tons of ore in stock and is sending out only its first grade ore. We learn that but 7,000 tons of ore has so far been sold, although it is probable that other sales will soon be closed.—[Norway Current.

Three steam shovels are now at work at the Biwabik and the daily output is the largest yet made.

In May the Mesabi Mountain property produced 69,015 tons of ore, on which $17,254 royalty was paid the State.

The Lake Superior mine, which is one of the promising properties of the Mesabi, is now raising ore from one shaft and shipping 12 to 15 cars daily. There are 150 men employed, including the exploring force on the western portion of the range.

Personal.

W. R. Warner, who has been with Rogers, Brown & Co., at Cincinnati, for a number of years, has recently accepted a position with Matthew Addy & Co., to represent them in Louisville territory.

John Birkinbine, the iron ore expert of the U. S. Geological Survey, has gone to the Mesabi range to make an examination of all its properties with a view to writing a report for the next volume of the "Mineral Resources of the United States." He is accompanied by David Williams and Chas. Kirchhoff, of the *Iron Age*.

Joseph D. Weeks, of Pittsburg, will sail for Europe shortly, to continue his investigations of the retort systems of coke making, as employed in Great Britain, in Germany and in Belgium.

Price McKinney, of the firm of Corrigan, McKinney & Co., who has been at El Concheno, Chihuahua, Mex., the past few months in charge of the gold mine recently acquired by his company, has returned to Cleveland.

The address of R. N. Dickman, of Cleveland, for the next few months will be in care of the Companio Beneficiadora, El Concheno, Chihuahua, Mexico.

The death is announced at Pittsburg, of E. M. Byers, who was for a number of years a partner in the firm of A. M. Byers & Co.

James Clifford, assistant superintendent of the South Chicago mills of the Illinois Steel Co., died recently at Valparaiso, Ind.

Bar Iron Scale Settled.

The conference on the bar iron scale, held at Youngstown, O., Thursday, June 27, had a larger attendance of the manufacturers than in any other year, Southern and Western mills being represented beside those of the valleys. There was a long discussion over the change of base, the manufacturers' committee contending that 1.1c bar iron would cause constant fluctuations in wages. The demand of the puddlers for a higher rate than $4 was presented to President Garland but was not brought before the conference. At 1 o'clock, Friday morning, agreement was reached on the scale as heretofore printed in these columns: a 1.1c base, $4 for puddling, and 25 cents advance in puddling for every 1-10 advance in iron. The 60-day clause was eliminated and the scale becomes operative for a year from Aug. 1. The average selling price of iron at valley mill for the first 60 days will determine the basis of wages in the next 60 days, the rate being thus fixed every two months.

A meeting of the Merchant Bar Iron Association was held in Youngstown, on Friday, June 28, and an advance in common iron to 1.2c valley mill was decided on to go into effect July 1. There is talk of a further advance and another meeting will be held in Chicago at an early date.

THE J. Peters Iron Co., Ironton, O., lessee of the Lawrence Furnace at Culbertson in the same county, has sold 2,000 tons of its silvery iron for July and August delivery, at an advance of $1 a ton.

HOW HIGH CAN IRON AND STEEL PRICES GO?

The period from 1873 to 1879 was one of great and continuous industrial depression in the United States. It was a period of severe reaction from the high prices and excessive speculation which had been created by the civil war and which had been fostered by large issues of paper money and of bonds and other certificates of indebtedness which performed the functions of money. All values were inflated. The period of inflation ended with the Jay Cooke panic of September 18, 1873. Then followed almost six years of hard times, during which prices may be said to have shrunk to a gold basis. On January 1, 1879, the act of Congress providing for the resumption of specie payments went into effect, and soon afterwards the gold premium entirely disappeared. The successful resumption of specie payments was a leading cause of the revival of prosperity which occurred during the summer of 1879. Another leading cause was the exceptionally large European demand for our agricultural products which had set in in 1878 and which continued in 1879. This heavy demand, it may be added, continued in 1880 and 1881. In the two fiscal years ending on June 30, 1881, we imported $167,000,000 more gold and silver than we exported, this influx of gold beginning in 1879.

When the railroad managers discovered in the early months of 1879 that iron and steel prices would go no lower, and that their roads would be called upon to carry increased quantities of agricultural products to the seaboard for at least another year, they suddenly and almost simultaneously began to give out orders for iron and steel rails and for cars and locomotives, with the result that prices of all iron and steel products at once began to advance. Other consumers of these products, seeing that prices had commenced to go up, also began to buy more freely. An increase in the production of iron and steel followed as a matter of course, but this increase did not keep pace with the rapidly increasing demand. Prices advanced by leaps and bounds. The railroad companies and other consumers of iron and steel, finding that the home supply was not equal to the demand and that there seemed to be no limit to the advance in prices, began to place orders abroad. When the movement in this direction became general domestic prices receded as suddenly as they had started upward, and the boom broke. It lasted from the spring of 1879 to February, 1880, or about nine months.

To show how excited were our iron and steel markets during the boom of 1879 and 1880, and how great was the reaction in the prices of iron and steel products after its collapse, we present below a table which we have compiled from our records of that eventful period. The first column of the table gives the prices of eight leading articles in January, 1879, after the iron trade had commenced to feel the first pulsations of the approaching revival; the second column gives the highest prices reached during the boom; and the third column gives the prices four months after the boom had ended, and when the markets had become "steady," but with prices still much higher than when the boom commenced. The quotations in the third column varied but slightly during the remainder of the year.

Articles.	Price in Jan., 1879.	Price in Feb., 1880.	Price in June, 1880.
No. 1 anthracite foundry pig iron at Philadelphia	$17.00	$43.00	$23.00
Hanging Rock car wheel pig iron at Cincinnati	30.00	63.00	50.00
Refined bar iron at Philadelphia	42.56	89.60	51.07
Iron rails at mills in Eastern Pa	32.50	70.00	46.25
Steel rails at works in Pennsylvania	41.00	85.00	63.75
Old iron rails at Philadelphia	20.00	44.00	23.00
No. 1 wrought scrap at Philadelphia	20.00	42.50	23.00
Cut nails at Pittsburg and Wheeling	2.05	5.25	3.15

One serious effect of the boom was that the grip of foreign iron and steel manufacturers upon our markets could not be shaken off as suddenly as the boom had taken its departure. The strength of this grip will be realized by reference to a few typical figures. In the last of the panic years, 1878, our imports of pig iron, chiefly of qualities which had not been made at home, amounted to 66,504 gross tons, but in 1879 our imports of all kinds of pig iron reached 304,171 tons, and in 1880 they amounted to 700,864 tons. In 1881 we imported 465,031 tons; in 1882, 540,159 tons; in 1883, 322,648 tons; and in 1884, 184,269 tons. In 1878 our imports of both iron and steel rails amounted to nine gross tons; in 1879 they reached 39,417 tons; in 1880 they jumped to 259,542 tons; in 1881 they mounted still higher to 344,929 tons. In 1882 our imports of iron and steel rails declined to 200,113 tons, in 1883 to 34,801 tons, and in 1884 to 2,829 tons. While the boom for the iron and steel manufacturers of our own country lasted nine months, the boom for our iron and steel rivals abroad lasted several years. So far as the manufacture of iron and steel was concerned, foreigners reaped the largest benefits resulting from our revival of prosperity in 1879.

Shall this experience be now repeated? Shall domestic prices of iron and steel be now pushed up so high as to invite a reaction in prices if not in demand before the year closes or soon thereafter? Shall foreign iron and steel manufacturers now secure a ready entrance into our markets, from which, with the exception of our large demand for foreign tin plates, they have long been virtually debarred? These questions are worthy of the instant consideration of American iron and steel manufacturers. Below we briefly express our own views of the situation.

The first thought that occurs to us in considering the questions above mentioned is that the conditions of home production of iron and steel are not the same to-day that they were in 1879 and 1880. Then our productive capacity was wholly unequal to the demand; now in all lines, except tin plates, it is fully equal to any possible demand if reasonable time be given to fill orders. So far as capacity is concerned, therefore, there exists to-day no serious menace to the continuance of the present healhty conditions.

As to prices it may be said that the advance from May 1 to July 1 has been at a very rapid pace. It has been justified, however, by two years of depression, often accompanied by serious losses, and by the advance which has taken place in the prices of raw materials and in the wages of labor. Thus far no unfair advantage has been taken of the necessities of consumers. High as prices are to-day they are only high by comparison with the abnormally low prices which preceded the advance last spring. And yet there is danger that prices may be advanced so far that consumers, especially if there be delay in meeting their wants, will do as was done in 1879—place liberal orders abroad. Then the market at home would undoubtedly weaken.

With the view of ascertaining how close our iron and steel manufacturers now are to the danger line of foreign importations, we have prepared with care the following table, which shows the present prices of 13 articles, of which No. 1 foundry pig iron is Scotch Gartsherrie, angles, tees and beams are Belgian products, and the others are British products—all free on board. To the foreign prices we have added duties and freight to New York, and with the aggregates thus obtained we have compared the present prices of corresponding domestic products at Philadelphia, with the exception of steel rails which are at mills in Pennsylvania. The price of tin plates as given in the table is per box of 100 pounds; all other prices are per ton of 2,240 pounds. The black plates referred to are of tin plate gauges. The table is as follows:

Articles	Price abroad, June, 1895.	Duty.	Freight.	Price of foreign products at New York.	Price of domestic products at Philadelphia.
Bessemer pig	$10.27	$4.00	$1.50	$15.77	$14.60
Gray forge pig	8.14	4.00	1.50	13.64	11.50
No. 1 foundry	12.27	4.00	1.50	17.77	13.15
Bessemer billets	18.85	6.72	1.75	27.32	22.80
Tin plate bars	18.24	6.72	1.75	26.71	25.40
Steel rails	17.03	7.84	1.50	26.37	24.00
Angles	21.23	13.44	1.50	36.17	31.36
Tees	21.23	13 44	1.50	36.17	36.96
Beams	21.23	13.44	1.50	36.17	33.60
Common bars	26.76	13.44	1.75	41.95	31.36
Refined bars	34.06	13.44	1.75	49.25	33.60
Black plates	36.49	27.44	2.50	66.43	67.20
Tin Plates, box	2.43	1.20	.10	3.73	3.75

We need not enter into an analysis of the possibilities which will be suggested by the above table. Every iron and steel manufacturer will do that for himself. We will call attention to only one conclusion to which the table unerringly points. Our new tin plate industry will be overwhelmed by foreign competition if the prices of black plates and tin plate bars are materially advanced above present quotations. Welsh tin plate makers sent us 94,634 gross tons of tinplates in the first five months of this year, as compared with 83,117

tons in the same period of 1894, the new duty making this increase possible. They are now watching like hawks for an opportunity to still further increase their shipments.

No wise man will want a boom in iron and steel prices. There is no boom now, notwithstanding some foolish newspaper statements. Prices are still below those of two years ago, when the depression began. What is wanted is a continued healthy demand and a continuance of prices substantially where they now are. The foreign prices we have presented and the bit of history we have revived from the records of 15 years ago will convince our readers, we hope, that a continuance of present prices is far better than higher prices for a short period, to be certainly followed by a sharp reaction.—[Bulletin of the American Iron and Steel Association, July 1.

An Important Factor in the Building Trade.

An addition has been made recently to the well-known hydraulic-press family of brick works, through the acquisition of the plant of the Akron Vitrified Pressed Brick Co., at South Park, 10 miles from Cleveland, by the Akron Hydraulic-Press Brick Co., of Cleveland. The works at South Park ,whose specialty has been the Akron vitrified red brick, have been equipped with the hydraulic presses that embody the well-known patents of the Hydraulic-Press Brick Co. This means an output of 25,000 brick a day from each machine and a product that has attracted the attention of brick men and architects all over the country by reason of its rich, unfading red, its density and its great resistance to weight. The new company has been incorporated with a paid-in capital of $300,000 and has for its officers: E. C. Sterling, president, St. Louis; S. S. Kimbell, vice president, Chicago; H. W. Eliot, secretary and treasurer, St. Louis; Wm. H. Hunt, general manager and assistant treasurer, Cleveland.

Mr. Hunt has fitted up the largest of the company's offices, 504, 505 and 506 Cuyahoga Building, Cleveland, as an exhibition room. Built up around its walls are more than 60 panels, some representing various shades of reds and browns manufactured by the Akron Hydraulic-Press Brick Co., of Cleveland, and the Findlay (O.) Hydraulic-Press Brick Co., and others showing the different colors of buff, mottled, gray, Pompeiian, old gold and pink, manufactured by the New York, Eastern and St. Louis hydraulic companies. The idea is to bring architects, contractors and intending block-owners to this exhibition room and show them just how the brick will look in the wall. There are in Cleveland and in all the large cities of the country monumental buildings in which are represented the Standard, Roman and ornamental shapes of the Akron Hydraulic-Press Brick Co. For the convenience of the local trade, the company has established a store-room and yards in Cleveland, and will carry, beside, for quick delivery, chimney toppings, copings, flue linings and mortar colors.

The Outlook for Fire Brick.

Answering *The Iron Trade Review's* recent letter addressed to machinery manufacturers and dealers in foundry, furnace and mill supplies, Stowe, Fuller & Co., fire brick dealers, Cleveland write: "We found some improvement in our business up to June 1st, but during June business has dropped off somewhat, we think probably on account of labor troubles. Although the first five months of the year looked well for the fire brick business there is now very little new construction going on in the different factories and we think the next six months will be very dull. We have just closed a large contract for the Government for the Soo Canal boiler house which will take a small boat load of fire brick. These brick will be the Mount Savage brick which are specified by the Government after tests in the different navy yards and found to be the best."

THE Akron Cultivator Co., Akron, O., has completed a full equipment of its McNeil patent balanced, automatic dump, charging barrows for the Charlotte Furnace at Scottdale, Pa. The order was received from Corrigan, McKinney & Co., of Cleveland, lessees of the Charlotte Furnace, who have used the same barrows with good results at their River Furnace in Cleveland.

ON July 1 wages were advanced 10 per cent to the 550 men now employed by the Otis Steel Co., Cleveland.

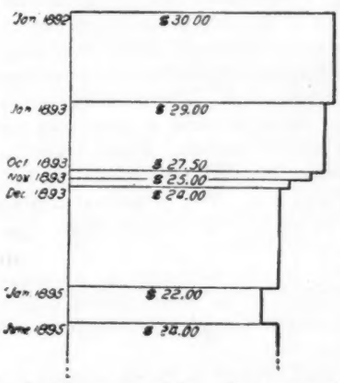
NEW TRACK-LAYING AND RAIL PRICES.

The statistics of new railroad building, which we have compiled for the half year to June 30, 1895, show that 547 miles of new track were built in that period. This compares with 495 miles of new railroad reported built in the same period last year. The figures do not show much change, but when a continued falling off in the total of new railroad built might reasonably have been looked for, it is encouraging to find that the record of the previous year has not only been reached but an advance made. The figures show only the new railroad completed, ready to be opened for traffic, and therefore give no indication of how great an improvement has come in the outlook for railroad construction. At present the prospects are that a much higher total of new railroad will be added to the existing mileage during 1895 than in the last few years.

The new track laid so far in 1895, is divided by states, as follows:

Arizona	64	Minnesota	8
Arkansas	42½	Mississippi	7
California	24	Missouri	15
Florida	7	New York	21
Georgia	66	North Carolina	32
Illinois	8	Ohio	27½
Indian Territory	15	Oklahoma	15
Indiana	15	Pennsylvania	47½
Iowa	½	Texas	78
Kansas	1	Utah	11½
Maine	14	West Virginia	12½
Michigan	5½		
Total United States			545

The assurance, in practically all branches of trade, of approaching prosperity, has affected the price of rails more slowly than that of other materials of construction, probably due to the fact that rail renewals by railroads during the past six months have been made very slowly as compared with the activity which has characterized city building and other construction work. Whether due to an increased buying for renewals or to a sympathetic connection between the price of rails and other materials of construction, the price has advanced from $22 to $24. The accompanying diagram shows the prices for standard sections at Pennsylvania mills since 1891. The rapid fall from $29 to $24 per ton during the three months in the fall of 1893, which accompanied the rapid decline in wages and all prices subsequent to the industrial depression of the latter part of the summer of that year, is well shown in this diagram. The state of unvarying low prices during the past few months has been followed by the recent action of the Steel Rail Association, which at a meeting held in New York on June 20, decided to advance the price of standard sections $2 per ton as indicated on the diagram.—[Railroad Gazette.



Possible Extensions of the Otis Steel Plant.

Jeremiah Head, the well known English engineer, and his son Archibald Head, who is associated in his work, have been in the United States the past two weeks, having Cleveland as their headquarters. They represent the liquidator and the English debenture holders of the Otis Steel Co., and their mission to this country is to investigate the needs of the Otis plant, with a view to putting it on a basis, as far as equipment and facilities go, competitive with other steel plants in the Central West. The Messrs. Head have visited the steel plants of Pittsburg, Youngstown, Cleveland, Lorain and the Chicago district, and it is understood will make a thorough report on the advantages found at these various points. It is known that the erection of blast furnaces at the Otis plant, at which ample ground can be made by filling along the lake shore, is under consideration. The advantages of a Lake Erie site will be presented to the English holders of Otis Steel Co. bonds, and the question will then be decided whether the necessary capital will be furnished to give the plant all the economies in steel-making which it would have with its own furnaces and the most modern steel-making equipment.

"KEEP'S COOLING CURVES."

A paper of more than ordinary interest was that of W. J. Keep, of the Committee on Standard Tests and Methods of Testing Materials, presented under the above title at the meeting of the A. S. M. E., at Detroit, last week. In its subtitle, Mr. Keep describes his paper as "A Study of Molecular Changes in Metals Due to Varying Temperatures." We quote the author's opening statement:

"In a paper read before this society last December, I endeavored to show that a measure of the shrinkage would indicate whether a mixture of cast iron needed more or less silicon. In my reply to the discussion of that paper I made the following statement: 'The question has been raised whether cast iron expands at the instant of solidification. There is no such instant. Each crystal forms and shrinks on itself, and even if it did expand, it is not until such crystals are numerous enough to form a rigid shell that the casting can shrink, and any expansion of each crystal could not affect the whole casting.' The following investigation was made to prove the truth or error of this statement.

"When cast iron enters a mold a thin skin of solid iron is instantly formed by the cooling action of the sides of the mold. This is proven by breaking a casting which is still fluid; the central portion will run out, but the skin will settle on the surface of the metal which remains, but will retain its own integrity. Having once formed, the heat of the metal can never melt it again, though at first it has no rigidity, but is apparently in an amorphous condition. New crystals form on the interior of this skin very rapidly, and as the mold prevents any expansion outward, if there was any expansion it would be inward, which would lessen the holding capacity of the interior. This skin in a few seconds becomes rigid. The fluid interior is contained in a rigid shell of the same metal at practically the same temperature as the melted portion. I have taken for illustration the top of a runner from a blast furnace pig bed, the molten inside having run out. The individual crystals must be of the same form as the aggregations, which are regular octahedrons. The edges of the largest are ⅝" long. Another sample is perfectly regular, each edge ¼" long, and was obtained at another time. It lay loose among others. Each aggregation has formed independently of others, and all are attached to the outer shell.

"When the sprue has a shell formed on its top surface, if a hole is broken through it the currents of the molten metal can be seen, but no metal ever exudes. On the contrary, if the casting is of any considerable size the fluid metal will sink, and to produce a full casting more fluid metal must be fed to it. This proves that the fluid metal does not expand as it loses heat, and it also proves that each crystal does not expand, at least, not so fast as to overcome the general shrinkage from loss of heat."

A description is then given of the machine which was devised to make the record of expansion and shrinkage. A mold is made of a test bar 1" square and 26" long. In the front of the flask near the end of the mold recesses are cut to allow the ends of the mold to be reached. An autographic machine composed of a cylinder wound with paper ruled into squares, with a clock allowing the cylinder to turn once in an hour, is attached to the mold at each recess by a 1" round pin which projects upward to form a bearing for arms which are to transmit the motion of the test bar. The outer ends of the arms multiply any motion of the ends of the test bar ten times. The right hand arm moves a slide which carries a recording pencil. The expansions or shrinkages of the test bar are projected on the paper in curves. The resulting line, if there had been no expansion of the metal, might have been expected to be a smooth, regular curve, the ordinates of which would depend for their length upon the temperature of the casting alone. Instead of obtaining such a smooth curve, it was found in Mr. Keep's experiments, that the ordinates varied in length in such a manner as to make the outline very irregular during the first part of the cooling.

It was developed by the records of repeated tests that the curves registered by the cooling iron varied in shape with change in chemical and physical composition. Iron high in silicon made what Mr. Keep calls the most attractive curve. The silicon was 3.85 per cent, phosphorus 1, sulphur .10, manganese .50 and carbon 3.10. The paper says: "This is a mixture which gives excellent results for thin castings which are very strong and soft. The lower the carbon the higher must be the silicon to produce soft castings. The curve shows that the casting remained fluid for one minute, during which time the ends of the bar remained stationary. When the whole of the test bar had become solid it expanded for 16 minutes. The expansion began 1½ minutes after the mold was filled, increased until 3½ minutes, then decreased until seven minutes. This I name the *1st Expansion.* The expansion then increased until eight minutes, and decreased again until 10 minutes. This I call the *2d Expansion.* A very great expansion then takes place, reaching its maximum between 12½ and 14 minutes, and decreasing until 16 minutes, or a little later. This I call the *3d Expansion.* When these expansions are completed the regular shrinkage curve from the loss of heat is formed, the same as in the simple metals.

"This shrinkage had been acting from the beginning, for the metal had been parting with its heat all the time, but the expansions were great enough to overcome all this shrinkage during the first 16 minutes. Another proof of this is that the shrinkage curve of all 1" square cast iron bars takes substantially the same direction after the 3d Expansion is completed.'"

It is the intention of the committee, the paper says, to determine with a La Chatelier pyrometer, the temperatures at which the three expansions take place. The diagrams Mr. Keep has made thus far show, however, that each expansion occurs at a definite temperature. One of the experiments demonstrated to his satisfaction that "in melting graphitic cast iron the graphite changes to combined carbon when the temperature of the 3d Expansion is reached, instead of at the temperature of fusion. Unlike white cast iron, the iron is in an expanded state from the 3d Expansion to the point of fusion; *i. e.*, the atoms are not as close together. In white iron, with the carbon combined in the cold casting, there is no change in the crystalline structure during the heating, and the iron does not reach the expansion which causes it to fuse until just before fusion. Gray cast iron reaches its greatest expansion much sooner than white iron, with the result that it melts from the outside of the casting, and does not become plastic to the extent that white cast iron does."

Another conclusion reached by Mr. Keep as the result of this series of experiments is that the strength of cast iron is entirely dependent upon the character of the crystallization. He is confirmed in the position he has taken on other occasions that strength may vary in spite of identical chemical composition. In his concluding paragraph the author says: "The final adjustment of crystals and formation of graphite in half inch bars occurs within three minutes after the mold is filled. It is a question whether a jar or vibration would hasten or would influence the formation of crystals, and in that way affect the strength of a casting, or whether the manner in which the iron enters the mold exerts any influence. Perhaps this question can be answered by obtaining autographic records from a number of bars all poured from one ladle, and consecutively, without loss of time. It appears that the discovery of these cooling curves may lead to a perfect understanding of these intricate molecular changes."

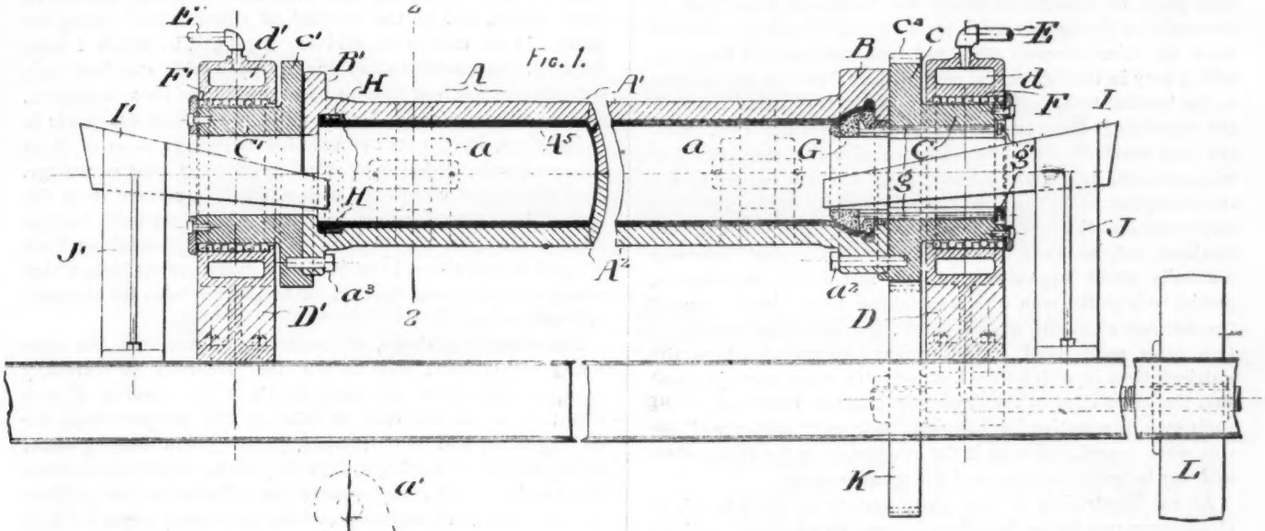
Moorhead-McCleane Works Sold.

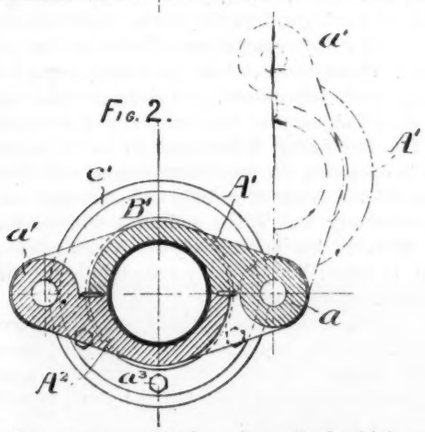
The works of the Moorhead-McCleane Co., at Pittsburg, were sold by the sheriff Monday, July 1 and were bid in by Thos. Patterson, attorney for the New York Life Insurance Co. at $11,000, the amount of the taxes on the property. The life insurance company held a mortgage for $350,000, which with interest amounted to $370,000. It thus obtained the property, which is worth $1,000,000 for $381,000. The sale has swept away the mortgage of the extensive creditors of the company, amounting to about $600,000. The receiver had opposed the sale on the ground that the general creditors would get nothing, but he was overruled by the court. The New York Life Insurance Co. will not operate the property but will hold it subject to sale or lease. It could be sold, doubtless, at a handsome profit. The property comprises 10½ acres of land. On this are five sheet iron mills, two plate mills, the Soho blast furnace, a foundry, machine shop and other appurtenances of a mill. The land alone is estimated to be worth $400,000. In addition to this the Moorhead-McCleane Co. owned four acres of adjoining land, with coke ovens.

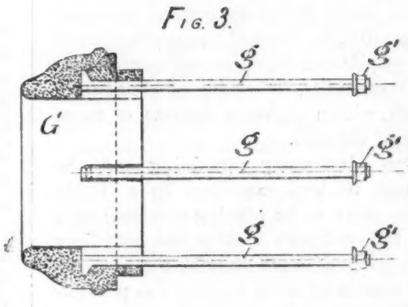
APPARATUS FOR CASTING PIPE.

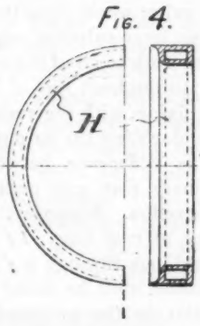
With the unprecedented amount of competition now experienced in all branches of industry, new inventions which tend to reduce the cost of production are gladly welcomed by manufacturers. This is especially true in the iron trade, and foundrymen who a few years ago were content to follow the practice of their grandfathers, are now constantly on the outlook for new methods or machines by which the productive capacity of their plant may be increased and the cost account reduced. More efficient cupolas, improved and quick-acting facilities for lifting and handling material, sand-sifting and mixing machines, molding machines, besides numerous other minor labor-saving devices, are rapidly finding their way into the modern foundry.

There has, however, been but little change in the methods of molding cast iron water and gas pipe. Special forms of flasks are used and some foundries have adopted a form of reaming machine for forming the surface of the vertical sand molds. This, of course, requires the making and setting of the usual continuous cylindrical core and its subsequent removal from the completed casting, all of which amounts to a considerable proportion of the labor element of the cost.









A patent which contains features of special interest to those founders who are engaged in the manufacture of pipes, columns or other articles containing approximately cylindrical or conical cores, was recently granted to Strickland L. Kneass, of Philadelphia, for a machine for casting hollow articles. The system involved consists, briefly stated, in pouring fluid metal upon the interior surface of a mold rotating upon an approximately horizontal axis, and the consequent even distribution of the metal while setting. The machine is arranged to have a sectional iron mold clamped between two adjustable heads, rotating upon spindles which may either be horizontal or slightly inclined. A special form of ladle or trough passes through the hollow spindle of one of the heads so as to distribute the metal evenly throughout the length. This trough is filled with the proper weight of metal, the mold rotated by power, and the metal then spread over the mold, forming at once a thin sheet over the entire surface which gradually thickens as the metal congeals. The mold is then opened and the red hot casting is rolled out, perfectly clean and without gates, risers or fins. The mold is wiped out and cooled slightly and is then ready for another pouring. If the axis of rotating is horizontal, the cavity in the center will be cylindrical; if inclined, conical. Taper columns, lamp posts, etc., can be made in this way by setting the lowest element of the mold approximately horizontal, and the axis inclined, and the metal will be of practically even thickness throughout the whole length.

For cast iron pipe, the axis of rotation must be horizontal, and a short supplementary core is inserted, exactly the same length and shape as the inside of the bell, and this is held in place on the head by T-head bolts set in slots in the hollow spindle. The bell mouth part of the mold being further radially from the axis than any other part, would absorb too much of the fluid metal if this core were not placed in position to displace it and compel the metal to distribute evenly. A further matter requiring provision, is the strain upon the pipe and mold due to the shrinkage of the casting during cooling. This has been accomplished by the inventor by inserting in the groove in the mold which forms the bead, a light collapsible ring so that the casting, which is rigidly held at the bell by the mold, will have an opportunity of shrinking and crushing the light ring before sufficient strain can be brought upon the pipe or the mold to cause rupture.

The construction of the machine is practical; it is not expensive to build, while the power required for rotation is small, as high speeds are not essential. The two heads are heavily designed, and are arranged to accommodate a wide range of sizes of pipes or other articles. Special arrangements are devised for pouring the fluid metal evenly upon the mold without unnecessary chilling; and the actual time required for pouring, opening, cleaning and preparing mold for another pouring is insignificant, so that a large output is obtained from one machine working continuously on the same size mold. The character of the metal is close and fine grained, and stronger than that poured in sand molds, without being hard. A less thickness of pipe would therefore be able to stand a given internal pressure than if made by the old method. The chief advantage claimed, however, is the saving in labor, which although varying somewhat with the form and shape of the article or diameter of the pipe, is a very large percentage of the amount paid even in the most economically managed foundries.

In the accompanying illustrations, Fig. 1 represents a verti-

cal longitudinal section of the apparatus employed. Fig. 2 is a transverse section of the mold upon the line 2 2 of Fig. 1. Fig. 3 is a sectional view, on an enlarged scale, of the local core which is used as an adjunct in forming the bell-mouth of the pipe. Fig. 4 embraces, also on an enlarged scale, a partial end view and a sectional view of the collapsible ring, which is employed to permit the longitudinal contraction of the casting during cooling.

DIFFERENTIAL SYSTEM OF PIECE-WORK.

Probably no paper presented at the meeting of the A. S. M. E. at Detroit last week attracted so much attention, next to that of Mr. Keep on "Cooling Curves," as Fred W. Taylor's discussion of the piece-rate system of wages as enforced at the Midvale Steel Works. An extended synopsis of the paper was given in these columns last week. We are glad to add the extracts given below. It will be remembered that the foundation of Mr. Taylor's system is an analysis of all the work of an establishment, separating each job into the elementary operations of which it is composed:

It is the writer's opinion that a more complicated and difficult piece of rate-fixing could not be found than that of determining the proper price for doing all kinds of machine work on miscellaneous steel and iron castings and forgings, which vary in their chemical composition from the softest iron to the hardest tool steel. Yet this problem was solved through the rate-fixing department and the "differential rate," with the final result of completely harmonizing the men and the management, in place of the constant war that existed under the old system. At the same time the quality of the work was improved, and the output of the machinery and the men was doubled, and, in many cases, trebled. At the start there was naturally great opposition to the rate-fixing department, particularly to the man who was taking time observations of the various elements of the work; but when the men found that rates were fixed without regard to the records of the quickest time in which they had actually done each job, and that the knowledge of the department was more accurate than their own, the motive for hanging back or "soldiering" on this work ceased, and with it the greatest cause for antagonism and war between the men and the management.

As an illustration of the great variety of work to which elementary rate-fixing has already been successfully applied, the writer would state that, while acting as general manager of two large sulphite pulp mills, he directed the application of piece-work to all of the complicated operations of manufacturing throughout one of these mills, by means of elementary rate-fixing, with the result, within eighteen months, of more than doubling the output of the mill.

The difference between elementary rate-fixing and the ordinary plan can perhaps be best explained by a simple illustration. Suppose the work to be planing a surface on a piece of cast iron. In the ordinary system the rate-fixer would look through his records of work done by the planing-machine, until he found a piece of work as nearly as possible similar to the proposed job, and then guess at the time required to do the new piece of work. Under the elementary system, however, some such analysis as the following would be made:

Work done by Man.	*Minutes.*
Time to lift piece from floor to planer table	——
Time to level and set work true on table	——
Time to put on stops and bolts	——
Time to remove stops and bolts	——
Time to remove piece to floor	——
Time to clean machine	——
Work done by Machine.	*Minutes.*
Time to rough off cut ¼ in. thick, 4 feet long, 2½ ins. wide	——
Time to rough off cut ⅛ in. thick, 3 ft. long, 12 ins. wide, etc.	——
Time to finish cut 4 feet long, 2½ ins. wide	——
Time to finish cut 3 feet long, 12 ins. wide, etc	——
Total	——
Add —— per cent for unavoidable delays	——

It is evident that this job consists of a combination of elementary operations, the time required to do each of which can be readily determined by observation. This exact combination of operations may never occur again, but elementary operations similar to these will be performed in differing combinations almost every day in the same shop. A man whose business it is to fix rates soon becomes so familiar with the time required to do each kind of elementary work performed by the men, that he can write down the time from memory. In the case of that part of the work which is done by the machine the rate-fixer refers to tables made out for each machine, and from which he takes the time required for any combination of breadth, depth, and length of cut.

While, however, the accurate knowledge of the quickest time in which work can be done, obtained by the rate-fixing department and accepted by the men as standard, is the greatest and most important step towards obtaining the maximum output of the establishment, it is one thing to know how much work can be done in a day, and an entirely different matter to get even the best men to work at their fastest speed or anywhere near it.

The means which the writer has found to be by far the most effective in obtaining the maximum output of a shop, and which, so far as he can see, satisfies the legitimate requirements, both of the men and the management, is the differential rate system of piece-work.

* * * Not the least of the benefits of elementary rate-fixing are the indirect results. The careful study of the capabilities of the machines, and the analysis of the speeds at which they must run, before differential rates can be fixed, which will insure their maximum output, almost invariably result in first indicating and then correcting the defects in their design, and in the method of running and caring for them. In the case of the Midvale Steel Co., to which I have referred, the machine shop was equipped with standard tools furnished by the best makers, and the study of these machines, such as lathes, planers, boring mills, etc., which was made in fixing rates, developed the fact that they were none of them designed and speeded so as to cut steel to the best advantage. As a result, this company has demanded alterations from the standard in almost every machine which they have bought during the past eight years. They have themselves been obliged to superintend the design of many special tools which would not have been thought of had it not been for elementary rate-fixing.

But what is, perhaps, of more importance still, the rate-fixing department has shown the necessity of carefully systematizing all of the small details in the running of each shop; such as the care of belting, the proper shape for cutting tools, and the dressing, grinding and issuing same, oiling machines, issuing orders for work, obtaining accurate labor and material returns, and a host of other minor methods and processes. These details, which are usually regarded as of comparatively small importance, and many of which are left to the individual judgment of the foreman and workmen, are shown by the rate-fixing department to be of paramount importance in obtaining the maximum output, and to require the most careful and systematic study and attention in order to insure uniformity and a fair and equal chance for each workman. Without this preliminary study and sytematizing of details, it is impossible to apply successfully the differential rate in most establishments.

As before stated, the success of this system of piece-work depends fundamentally upon the possibility of materially increasing the output per man and per machine, providing the proper man be found for each job and the proper incentive be offered to him.

* * * The moral effect of the writer's system on the men is marked. The feeling that substantial justice is being done them renders them on the whole much more manly, straightforward and truthful. They work more cheerfully, and are more obliging to one another and their employers. They are not soured, as under the old system, by brooding over the injustice done them; and their spare minutes are not spent to the same extent in criticising their employers. A noted French engineer and steel manufacturer, who recently spent several weeks in the works of the Midvale Co. in introducing a new branch of manufacture, stated before leaving that the one thing which had impressed him as most unusual and remarkable about the place was the fact that not only the foremen, but the workmen, were expected to and did in the main tell the truth in case of any blunder or carelessness, even when they had to suffer from it themselves.

It is my opinion that the most successful manufacturers, those who are always ready to adopt the best machinery and methods when they see them, will gradually avail themselves of the benefits of scientific rate-fixing; and that competition will compel the others to follow slowly in the same direction.

THE HUNT SYSTEM OF SHOP RAILWAYS.

That narrow gauge railways for handling and transferring coal, castings, parts of machinery and materials of all kinds in and around manufacturing establishments constitute a very important part in the economy of industrial operation is becoming more fully appreciated, especially in plants of considerable magnitude, or where the various departments are in separate buildings. A system of cars and tracks is as much a machine as a lathe, a steam hammer or a loom, and should be judged in the same way. The saving in time and labor assured by its introduction, the increased efficiencies of other machines or of the whole works at once effected, the greater protection against damage afforded material being handled or moved, and the general convenience, must be balanced against the interest on the investment and the expense of maintenance.

In putting in a railway of this kind, many questions arise which require careful consideration. What gauge is the best for this purpose? What radius curves should be used? How heavy should the rail be? What style of cars will be best? What kind of cross ties should be used? How shall the switches and crossings be made? Can turn-tables be avoided? What will be the effect of grades, etc.? All these details suggest themselves. Their solution is not difficult if it is decided at the outset to put in a thoroughly tried and reliable system. The Hunt narrow gauge railways for industrial establishments are built by the well-known C. W. Hunt Co., 45 Broadway, New York, who have for many years given the subject careful consideration and are builders of high grade machinery of this class. In determining the gauge and the radius of the curves most suitable for an industrial railway, it is necessary to take into consideration all of the circumstances under which it is to be used. The C. W. Hunt Co. believe that if the gauge adopted by them (21½ inches measured from the outside to the outside of the heads of the rails) is not the ideal one, it comes very near to being so. In all of the railways that they have built, they have never had a user suggest that a broader gauge would be better for any purpose.

In a manufacturing establishment the curves should be of so short a radius that every part of a factory can be reached directly without expensive and troublesome turn-tables. The Hunt Co. state: "Our standard curves are 12 feet radius measured to the centre of the tracks. This radius is almost exclusively used in manufacturing establishments where cars are usually moved by hand, because cars can be used with a running gear which runs as easily on a curve of 12 feet radius as on a straight line, the axles taking a radial position with the outer wheel running on the flange, instead of on the tread, thus enabling workmen to move double the load they could with ordinary cars. It is for this reason that we build our railways with outside flanged wheels. These variations from ordinary railway practice make no difference whatever in the operation of the general construction, except that the curves, switches and frogs must be especially arranged to suit wheels with outside flanges." The load which can be carried on a railway depends not upon the gauge, but upon the strength of the track; consequently whatever strength is needed to carry a certain load can be obtained with a narrow gauge as readily as with the standard 4 ft. 8½ inch gauge. The Hunt cars are of improved construction, and are fitted with a flexible wheel base, the axles taking a radial position on a curve, and the wheels and the curve so proportioned that there is no slipping whatever to cause friction. This departure from the old style rigid base cars is an important feature of the Hunt system and the advantage will be at once appreciated by anyone who has had experience with rigid wheel base cars.

The principle on which the cars turn a curve is illustrated in Figs. 1 and 2. A cylinder rolls on a plane in a straight

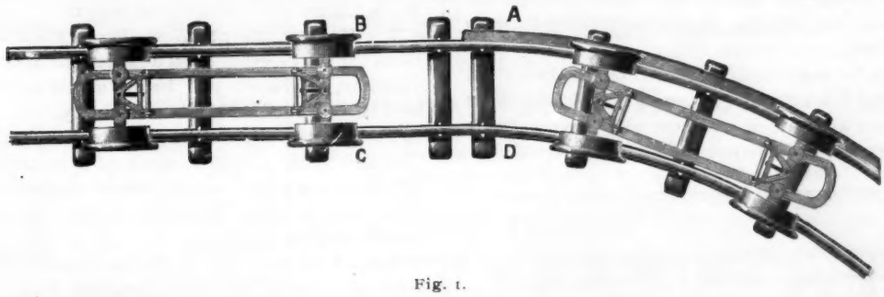


Fig. 1.

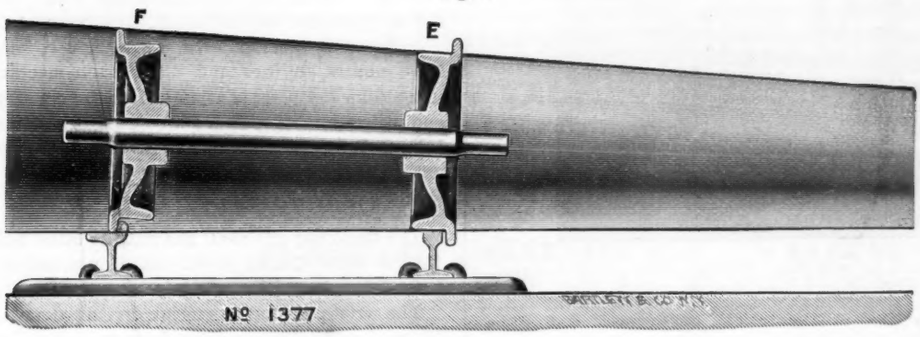


Fig. 2.

Figs. 1 and 2.—Hunt System of Narrow Gauge Railways for Manufacturing Establishments.

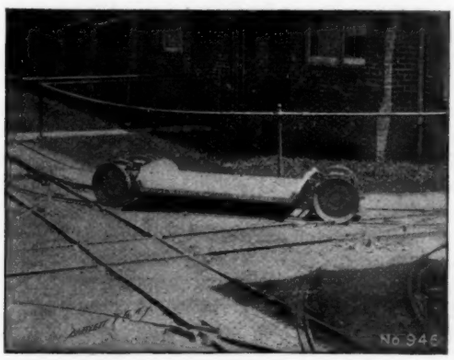


Fig. 3.—Special car floor 7 in. above the rails, for Brown & Sharpe Mfg. Co., Providence, R. I. The radial position of the wheels on the curve is well shown in this cut.

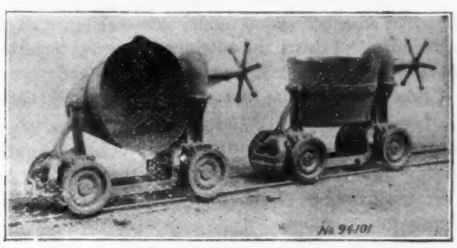


Fig. 4.—Special ladle car for melted iron, built for the Warder, Bushnell & Glessner Co., Springfield, O.

line without sliding friction; a cone rolls on a plane in a circle of which its apex is the center, without sliding friction. If the wheels of a car running on a curve have the same diameters, respectively, as the cross-sections of an imaginary cone projected across the tracks they may be considered as portions of the cone, and the wheels would run around the curve without sliding friction, the axles taking a radial position. The illustration Fig. 2 shows that if the wheels were correctly made, there will be no sliding friction in passing the curve. In applying these principles the outer rail around the curve is made of a special form, so that the wheel runs on a flange instead of on the tread. The axle bearings are pivoted in the center, between the wheels, permitting them to take a radial position, as the wheels direct.

Could the wheels be made absolutely true to the theoretical diameters, and the tracks perfectly smooth and laid to an exact circle, the cars would then pass around a curve as easily as on a straight track. It is impossible in commercial ma-

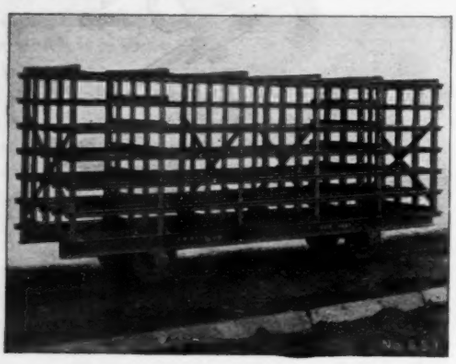


Fig. 5.—Special oven car with roller bearings, built for the American Tube Co., Boston, Mass.

chinery to fully realize theoretical conditions, but it is claimed that the difference between the running gear as furnished by the C. W. Hunt Co. and the ideal ones is slight.

Rigid wheel base cars do not run easily around a curve because one of a pair of wheels of the same diameter secured rigidly to the axle must slide on the rails a distance equal to the difference in the length of the inner and the outer rail. In a car having two pairs of wheels, with the axle boxes rigidly connected to the frames not only must this sliding take place, but it is increased by the unfavorable position in which the axles hold the wheels, as the axles cannot take a radial position, which is the one most favorable. Beside the Standard cars illustrated in its latest catalogue, the C. W. Hunt Co. is prepared to furnish cars of special design for carrying all kinds of material; and in this system of narrow gauge railways offers apparatus embracing in its construction all the latest improvements in machinery of this class.

President Moxham on the Advance in Steel.

Asked his opinion of the advance in prices of iron and steel, President A. J. Moxham made this response to the Lorain, O., *Herald*: "I think the advance has so far been healthy, but I was inclined to think it had nearly reached the normal figure. I think it would be better for the trade if the price did not advance further until the general business had accommodated itself to the new conditions. Steel is at a profitable figure to-day and it will be better for the trade for it to remain at a fair, normal profit than to reach an abnormal profit that can only be spasmodic."

For more than thirty years, H. W. Knight & Son, of Seneca Falls, N. Y., have made pattern letters and figures for foundrymen, and their long experience gives them a firm hold on the trade, and enables them to lead in their line. All letters are cast and finished by hand, and a large stock is constantly kept on hand, so that orders are promptly filled. In the smaller sizes, for which there is large demand, a stock of each one is kept numbering 30,000 finished and ready to ship. Some hair line letters, made specially for stove manufacturers, are so small it takes 10,000 to weigh a pound, and other large sizes weigh 20 pounds per character. The manufacturers have agencies all over the United States, also in Europe.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

The Griffin Variety Co., Griffin, Ga., is in the market for iron-working machinery.

"Deguenther," 100 Michigan St., Chicago, wants to buy an engine of 125 h. p., Corliss preferred.

Floering & Kane are a new firm recently formed at Adrian, Mich. They will manufacture boilers.

The Houston, East & West Texas has completed preparations for the erection of an addition to its machine shops at Houston, and work will begin at once. The new structure will be equipped with new machinery.

The Hartley Power Supply Co. has been incorporated at Chicago, with a capital stock of $1,000,000, to manufacture a "rotary cylinder" engine, the invention of Debert Hartley, who, with William H. Pettibone and Samuel A. Wright, incorporated the company.

Among the new incorporations licensed by the Secretary of State of Illinois, last week, was the Full Power Developing Co., at Chicago; capital stock, $150,000,000; to create, make, manufacture, develop, own, operate, use, buy and sell and lease motors, engines and other such machinery, apparatus, inventions and patents as enter into the creation, transmission and utilization of power; incorporators, Hugh A. Kelso, Jr., John S. Robertson, James M. Crews and Edwin M. Sims.

Fires and Accidents:—

The breaking of a shaft has put the billet mill engine of the Illinois Steel Co., at Joliet out of use, and it will be 10 days before the mill will start again.

The wrist-pin of a big engine driving structural mill rolls at Homestead broke Saturday, June 29, and before steam could be shut off the cylinders were demolished. It will take 10 days to repair the damage, and meantime the mill, which was busy on important structural orders, will be idle.

Additions, Enlargements, Removals, Etc.:—

The Fox Machine Co., of Grand Rapids, Mich., will enlarge its factory.

The announcement is made that the Lane Bridge & Iron Works, of Chicago, will remove to Wabash, Ind.

The Morn Gas Range Co., of Columbus, will remove its works to Lorain, O., uniting them with the National Vapor Stove Works.

The Holyoke Machine Co., of Holyoke, Mass., has made a contract for the erection of an extensive addition to its plant. Work will be commenced very soon.

The Braddock Wire Works, at Rankin Station, Pa., have been closed for two weeks for repairs. Extensions will be made in the rod, nail and barbed wire mills, so that 120 additional men can be employed. The force now numbers 950.

The Carnegie Steel Co. let the contract last week for two large additions to the Beaver Falls nail mill. One will be 85 feet long while the other will be an extension to the present buildings, part of which were destroyed by fire last February. The capacity of the plant will be more than doubled. The buildings will be completed within 30 days.

The Erie Car Works, at Erie, Pa., have started up under the ownership of Hamilton & Knoll, who have bought 2½ acres of ground and some of the buildings belonging to the Erie Car Works, Ltd. The present erecting shop is 222x65 feet in size, with an L of 40x20 feet. The forge shop is 100x75 feet, but it is contemplated to erect much larger shops after business increases, an option having been secured on 20 additional acres. In addition to car work, the firm will turn out engines and boilers.

New Construction:—

The Bath Iron Works, Bath, Me., are to have a new workshop built of steel.

The Reading Iron Co. is building two mills at Reading, Pa., to cost $250,000, for the manufacture of skelp iron.

The contract has been let to L. P. Hazen & Co., of Cincin-

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General Purpose Forming Rolls—all sizes.
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Experts pronounce this invention most valuable, furnishing an inexpensive method for utilizing the soft and waste ores and thus reclaiming a large percentage of the most superior minerals.
For terms, machinery, territory, etc., address

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M. NIRDLINGER, Pres. **360 Farwell Ave., MILWAUKEE, WIS.**

nati, to build the Big Four shops at Wabash, Ind. The contract amounts to $110,000.

Work on the new machine shops of the Houston & Texas Central, at Houston, is progressing and the new building will be ready for occupancy this month.

Work will begin soon on the plant of the Finished Steel Co., of Youngstown, O., which is to engage in the manufacture of shafting. A three-acre site has been chosen at Haselton.

The iron work for the power houses of the two rival Detroit electric lines will be built at the Variety Iron Works, Cleveland. One is for the Everett-Moore Co., and the other for the Johnson line. The contracts amount to about $50,000.

The Shiffler Bridge Co., of Pittsburg, builders of bridges and iron and steel structures, have a contract from the Illinois Steel Co. for the erection of a large iron building at Joliet, to contain a rod mill. The same firm have the contract for the columns for the 13-story office building to be erected by D. E. and W. G. Park, Pittsburg. They also have an order from Park, Bro. & Co., Ltd., for a building having a 138-foot span, to contain a copper mill.

The Leland & Faulconer Mfg. Co., Detroit, Mich., is erecting a steel foundry building, 262x56 feet, with cupola end 74 feet wide, also annealing and shipping building, 35x95 feet, of brick. The foundry will be entirely of steel and glass, with the exception of a brick wall around cupolas and core room. It is to be equipped with modern foundry appliances, steam hydraulic cranes and elevator, annealing furnace and cycloidal blower with upright engine on same plate or bed. The company will make a high grade of machine castings.

General Industrial Notes:—

The Buena Vista Iron Co. has leased the Buena Vista furnace to the Patch Iron Co.

The furnaces of the American Steel Casting Co., at Ernest Station, Pa., will soon be fired up.

The American Sheet Iron Works, of Phillipsburg, Pa., have made an advance of 10 per cent in wages.

The Fall Brook Coal Co. has placed its order for 250 coal cars with the Union Car Co., of Depew, N. Y.

At Altoona, Pa., the employes of the Pennsylvania railroad wheel foundry have been given an increase of 12½ per cent.

The furnace of the Appalachian Steel & Iron Co., at Big Stone Gap, Va., has been put in blast, after being idle for several months.

The Sloss Iron & Steel Co. is rebuilding its No. 2 stack at Birmingham, Ala. When finished it will be considerably larger and modern in every respect.

The Union Steel Co., Alexandria, Ind., has increased wages 10 per cent. The muck mill is ready to start up and the sheet mill will be ready in two weeks.

The puddling mills of the Cumberland Nail & Iron Works, Bridgeton, N. J., were started up on July 1, and next Monday the entire plant will be put in operation.

The LaBelle Iron Works, Wheeling, W. Va., have leased the nail plate train at the plant of the Jefferson Iron Works, Steubenville, O., and are rolling skelp on it.

The plant of the Pittsburg Tool Steel Co., which has been idle for a long time, has been leased by the Tretheway Mfg. Co., of Pittsburg, and is to be put in operation.

The Baltimore Tin Plate Co., of Locust Point, Md., and the Morton Tin Plate Co., of Cambridge, O., signed the tin plate scale of the Amalgamated Association on Saturday.

The Crane Iron Co.'s No. 3 furnace will probably be ready for blast during the early part of July. The company have also increased wages 10 per cent, dating from June 3.

It is announced that the Chateaugay Ore & Iron Co. will shortly begin to prepare its plant at Lyon Mountain, N. Y., to reopen business. New machinery of improved design will be used.

The River Furnace, Cleveland, under lease to Corrigan, McKinney & Co. as the River Furnace Co., has been making an excellent output lately. One day's run last week was 238 tons.

The Sunbury Nail Mill, Sunbury, Pa., has been purchased by Philsdelphia capitalists, and it is expected that the mill will be started within a few weeks. It has been closed for about four years.

T. W. Hill, of Cleveland, has been appointed receiver of the Lorain Mfg. Co., Lorain, O., and creditors will proceed to enforce the double liability of stockholders. It is believed all claims will be paid in full.

I. S. Oberbrunner was appointed receiver for the East End Foundry, Cleveland, June 26. The action was brought against Daniel A. Lynch, Michael W. Merriam and Geo. Kretzer. The receiver's bond is $5,000.

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OHIO FIRE BRICK. ALL SHAPES IN STOCK.
The largest shippers of **FIRE BRICK** in the West.
Warehouse and Docks: 193-195 Merwin Street, CLEVELAND, OHIO.

No. 2 furnace of the Isabella Furnace Co., at Etna, Pa., which has been banked down for two months, is again in operation. Three stacks are being operated, turning out 600 tons of metal every 24 hours.

The exact location of the Johnson Co.'s furnaces at Lorain, O., is not yet settled, but engineers are at work and a decision will be made soon. Work will begin in the fall, but no ore will be bought by the company until 1896.

The successful bid of the Globe Iron Works Co., Cleveland, on Cruiser No. 1, to be used on the lakes, was $147,800. There were two bids for No. 2, the lowest of which was for $159,991, made by the Atlantic Works, of East Boston, Mass.

The directors of the National Tube Works have declared the regular quarterly dividend of 1¾ per cent, payable July 1. The business of the company is showing considerable improvement, there being work ahead to keep mills running practically all summer.

At Dayton, the management of the Dayton Malleable Iron Works opened them to the men June 27, but the men refused to go to work at the wages received before their demand was made. The company announces that the works will close down indefinitely; that the advance cannot be paid.

A meeting was held at Sharpsville, Pa., by blast furnace employes, June 26, that it is said looks toward the formation of a union among blast furnace workers. A second meeting was appointed for Wednesday, July 3, at which employes of the various furnaces in the Mahoning and Shenango valleys are expected to be represented.

Prominent capitalists of New Castle, Pa., are talking of a company to build a large iron furnace. It is said that it will be located opposite the J. P. Witherow Works. The capital spoken of is $100,000 and it is stated that the output will go principally to the Shenango Valley Steel Co. Nothing definite has developed as yet, however.

The following notice was posted at the sheet mills of the Cleveland Steel Co., June 27: "On and after July 1, 1895, the present tonnage rates on the plate mill and plate mill furnaces will be advanced 10 per cent. All common labor will be advanced to $1.30 per day of 10 hours. The Cleveland Steel Co., Jno. A. Potter, vice president."

The new blast furnace of the Spearman Iron Co., Sharpsville, Pa., will be 76 feet high, while the hoisting tower and house will be 100 feet high and the casting house will be 140x60 feet and 28 feet high. Work on the other improvements about the furnace is going on rapidly and the stack is expected to be ready for blast about Sept. 1 next. The Spearman Iron Co. recently tore down their two old stacks and the present new stack is to replace them.

Bids were opened at Brooklyn, N. Y., last week on the contract for 13,000 tons of pipe, mainly 48-inch, and 150 tons of specials. A combination bid was made by the Warren Foundry & Machine Co., the McNeal Pipe & Foundry Co., and the Reading Foundry Co. of $20.40 per ton of 2,240 pounds on the pipe, 2¼c. for regular specials, and 4½c. for breeches specials. Chattanooga Iron & Pipe Co. bid $22.90 and 2c., respectively. Howard-Harrison Iron Co. bid $21.85 and 2¾c. R. D. Wood & Co. bid $21.30 and 2¼c.

The settlement of the wage scale at the Bay View mills of the Illinois Steel Co. is likely to take a longer time than usual, this year. The company has spent a large amount of money in installing new machinery, making it possible for tonnage men to increase their earnings considerably. In the finishing departments from $4 to $6 a day has been earned heretofore and this is increased. The management believes it should share in the advantages of the expensive equipment put in and will ask for a revision of present rates.

In addition to the furnaces now operating in the South, preparations are being made by the Tennessee Coal & Iron Co. to start the two stacks at Oxmoor, Sloss is pushing repairs on the single idle furnace and will start soon, Gadsden furnace will shortly be blown in, the two stacks at Woodstock are being placed in readiness, Gracy-Woodward, at Clarksville, Tenn., is expected to begin soon, and at other plants preparations are being made for a start. The total capacity of plants which will likely go in within 30 days, is about 1,400 tons per week.—[Manufacturers' Record.

At Pittsburg, in the orphan's court, a decision was given last week on the claims against the estate of the late James B. Scott. The claim of B. G. & W. U. Follansbee, Mr. Scott's partners, for $51,859.58, is refused. A decree was also made, distributing $35,736.21 among the general creditors of Mr. Scott, excepting the Follansbees. Claims, exclusive of the Follansbees', aggregated $265,965.18, and they thus receive about 13½ per cent. The claim of the Follansbees includes a balance of $27,659.58 due the firm from Mr. Scott; $20,000 cash paid to Andrew Carnegie, and amounts paid to five banks on notes.

REDUCED RATES.

Excursions over Pennsylvania Lines During Season of 1895.

Liberal concessions in fare over the Pennsylvania Lines have been granted for numerous events to take place this summer in various parts of the United States. In addition to local excursions, tickets at reduced rates will be sold over these lines as given in the following paragraphs. Excursion tickets may be obtained at ticket offices on the Pennsylvania system and will also be sold over this route by connecting railways. Some of the points to which tickets will be sold and dates of sale are as follows:

To Baltimore, July 16 and 17, good returning until August 5 inclusive, account the Convention of Baptist Young People's Union of America.

To Boston, July 5 to 9 inclusive, for the National Christian Endeavor Meeting. Return limit may be extended by special arrangement to August 3.

To Louisville, Ky., in September, for National Encampment, G. A. R. One cent per mile. Reasonable return limit.

To Boston, August 19 to 25 inclusive, account Triennial Conclave Knights Templar. Return limit extended to October 3 by special arrangement.

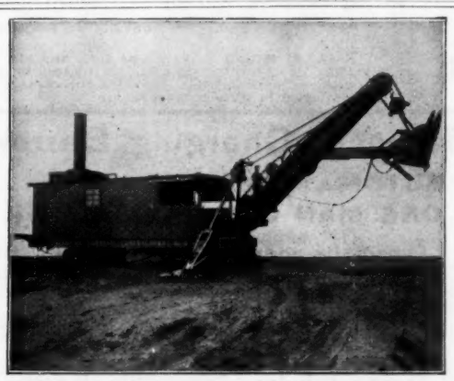
The reduced rates over the Pennsylvania Lines will not be restricted to members of the organizations mentioned, but may be taken advantage of by the public generally. Any Pennsylvania Line Ticket or Passenger Agent will furnish desired information concerning rates, time of trains, and other details, to all applicants, or the same may be obtained by addressing F. Van Dusen, Chief Assistant General Passenger Agent, Pittsburg, Pa.

SUMMER OUTINGS.

At Seashore, Mountain and Lake Resorts.

The Ocean Resorts—Atlantic City, Cape May, Asbury Park, Ocean Grove, Long Branch, and famous resorts along the New Jersey Coast are reached by the Pennsylvania Lines. As a direct route to Newport, Narragansett Pier, Cape Cod, Martha's Vineyard, Nantucket and the popular watering places along the Atlantic from Chesapeake Bay to Maine, these lines offer special advantages.

In the mountains—Cresson, Bedford Springs, Ebensburg, Altoona and other resorts in the Alleghenies are located on the Pennsylvania Lines, which also lead to the White Mountains, the Adirondacks, Watkin's Glen, Mt. Desert Island, and



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STAEM SHOVELS	Five sizes for every purpose. Standard Railroad Shovels. Special Shovels to order.
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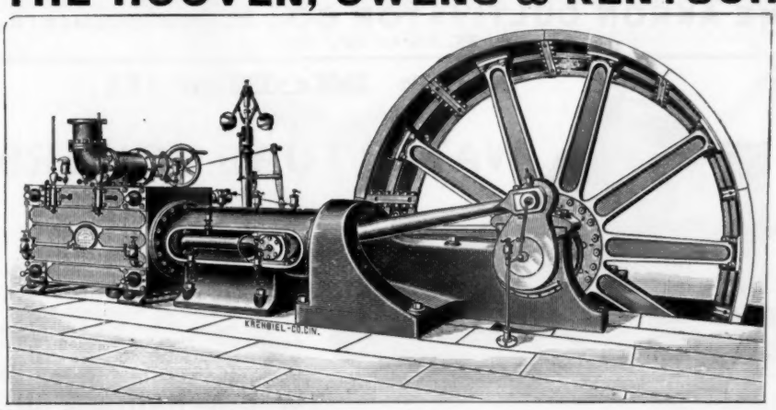

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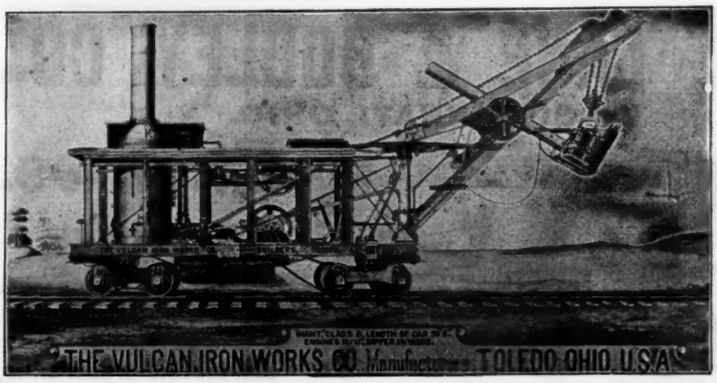

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Low Rates to Colorado.

On account of the meeting of the National Educational Association at Denver, Col., July 5 to 12, 1895, the North-Western Line will sell excursion tickets to Denver, Pueblo, Colorado Springs and Manitou at a rate not to exceed one fare for the round trip (with $2 added for membership fee). The time limit of these tickets will be extremely liberal, and an excellent opportunity will be afforded for a summer sojourn in the "Rockies," or enjoyable side trips to the Black Hills, Yellowstone National Park or the Pacific Coast. For full information apply to agents of connecting lines, or address W. B. Kniskern, General Passenger and Ticket Agent, Chicago & North-Western Ry., Chicago.; C. Traver, T. P. A., Marine National Bank Building, Pittsburg; F. M. Snavely, T. P. A., 151 St. Clair st., Cleveland, O.

THE Nickel Plate Road has compiled a list of country homes along the south shore of Lake Erie, willing to accommodate summer boarders, and a copy will be mailed to any address by enclosing a stamp to any agent of the Nickel Plate Road or to B. F. Horner, Gen'l Passenger Agent.

THE Nickel Plate Road has published a map of Boston, Mass., showing the location of the Christian Endeavor Convention Hall and State Headquarters of the 14th International Convention, July 10th to 15th, and presenting the merits of their through Drawing Room Sleeping Car line between Chicago and Boston. Write for a copy to any agent of the Nickel Plate Road or B. F. Horner, General Passenger Agent.

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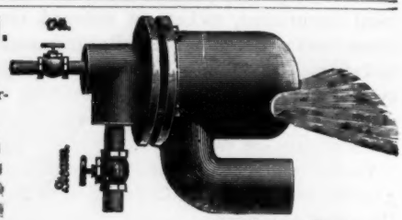

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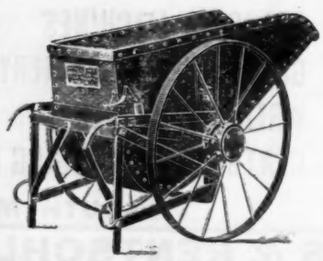

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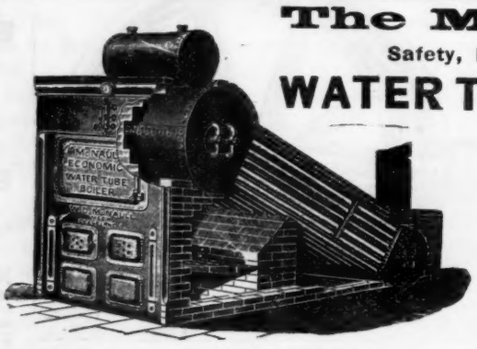

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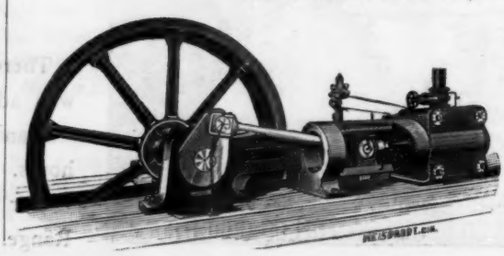

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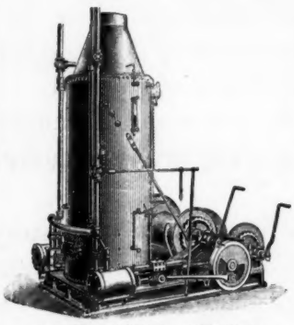
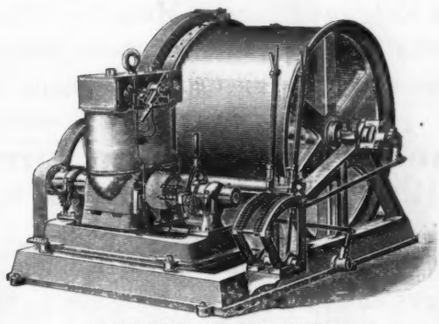


CONTRACTORS' ENGINE



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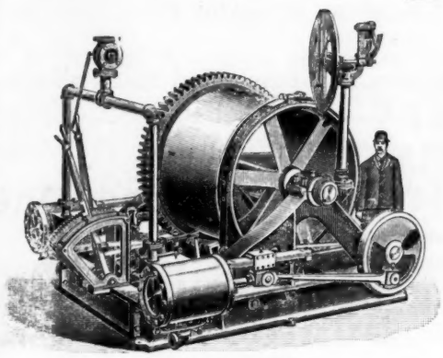

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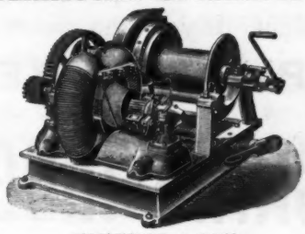

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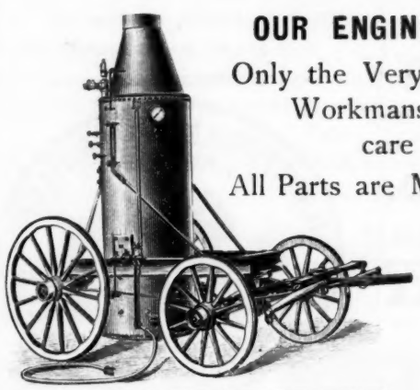

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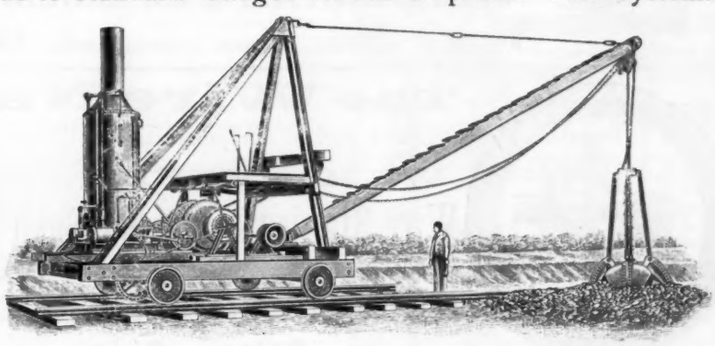

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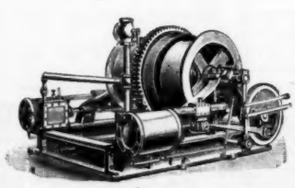

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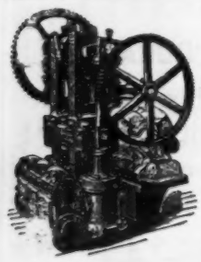

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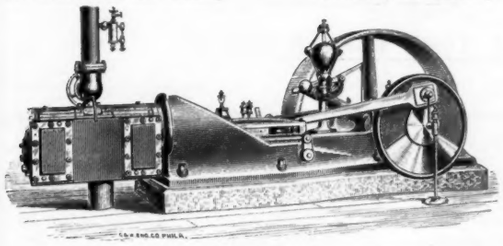

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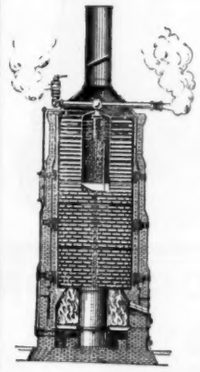

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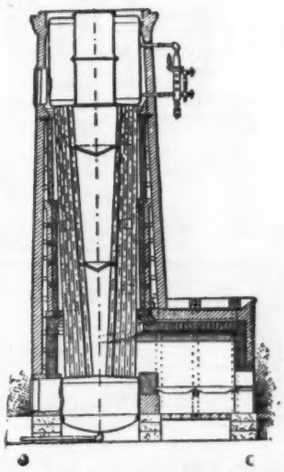

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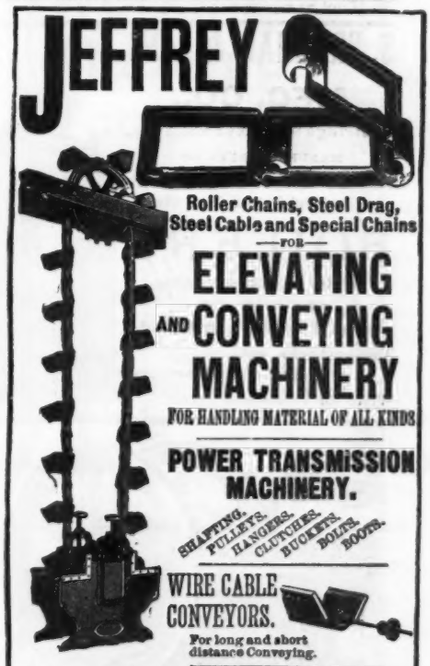

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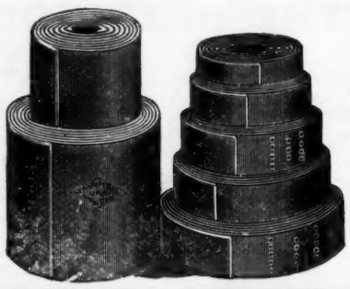

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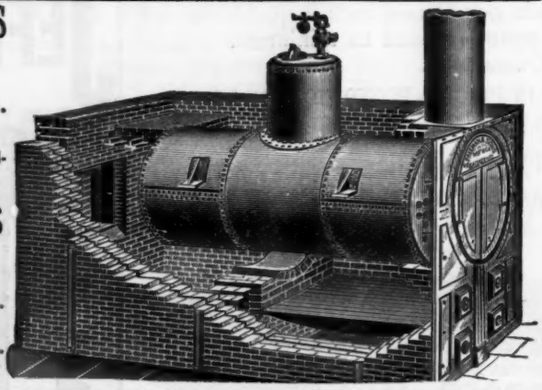

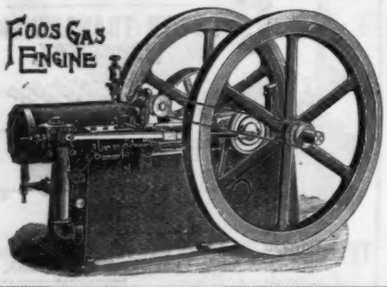

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Dies—
Toledo Machine & Tool Co., Toledo, O.
Cady Mfg. Co., Cleveland, O.

Ditching Machinery
Vulcan Iron Works Co., Toledo, O.

Drill Presses—
Prentiss Tool & Supply Co., Chicago, Ill.
W. F & John Barnes Co., Rockford, Ill.
Hill, Clarke & Co., Chicago, Ill.
Lodge & Shipley Machine Tool Co., Cincinnati.
C. H. Besly & Co., Chicago, Ill.
George Place Machine Co. New York City.

Drop Presses—
Toledo Tool & Machine Co., Toledo, O.
Cady Mfg. Co., Cleveland, O.
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
C. H. Besly & Co., Chicago, Ill.

Dredges—
Vulcan Iron Works Co., Toledo, O.

Eave Troughs and Conductors—
Berger Mfg. Co., Canton, O.

Emery and Corundum Wheels—
J. Wendell Cole, Columbus and Chicago.
The Tanite Co., Stroudsburg, Pa.
C. H. Besly & Co., Chicago, Ill.
Sterling Emery Wheel Mfg. Co., Tiffin, O.

Emery Wheel Machinery—
J. Wendell Cole, M. E., Columbus, O., or Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.
Sterling Emery Wheel Mfg. Co., Tiffin, O.

Engineers and Contractors—
Richard A. Parker, Marquette, Mich.
C. W. Hunt Co., New York City.
Jopling & Escobar, Cleveland, O.
John Fraser, Chicago, Ill.

Engineers' Supplies—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.
The Pittsburg Gauge Co., Pittsburg, Pa.

Engravers and Electrotypers—
Eclipse Electrotype & Engraving Co., Cleveland.
Cleveland Electrotype Foundry, Cleveland.
National Engraving Co., Cleveland.

Engines (Gas)—
Otto Gas Engine Works, Philadelphia, Pa.
Newell Bros., Cleveland, O.
Buckeye Mfg. Co., Union City, Ind.
Foos Gas Engine Co., Springfield, O.

Engine Packing—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Engines (Steam)—
Wm. Tod & Co., Youngstown, O
The John F. Byers Machine Co., Ravenna, O.
Totten & Hogg I. & S. F'dry Co., Pittsburg, Pa.
Lane & Bodley Co., Cincinnati, O.
Pen Argyl Iron Works, Pen Argyl, Pa.
Westinghouse Machine Co., Pittsburg, Pa.
B. F. Sturtevant Co., Boston, Mass.
The Edward P. Allis Co,, Milwaukee, Wis.
The Hooven, Owens & Rentschler Co.
American Hoist & Derrick Co., St. Paul, Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

Exhaust Heating Apparatus—
B. F. Sturtevant Co., Boston, Mass.

Factory Sites—
Chicago Heights Land Association, Chicago.

Fans—
Buffalo Forge Co., Buffalo N. Y.
B. F. Sturtevant Co., Boston, Mass.

Files, Makers of—
R. K. Morris & Co., Cincinnati, O.
C. H. Besly & Co., Chicago, Ill.

Fillet—
Milwaukee Fdy. Supply Co., Milwaukee, Wis.

Fire Brick and Clay—
J. V. Rose, Sharon, Pa.
Union Mining Co., Mt. Savage, Md.
Westmoreland Fire Brick Co., Pittsburg, Pa.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
American Fire Brick & Clay Co., Mineral Point, Ohio.
Reese, Hammond & Co., Bolivar, Pa.
Clearfield Fire Brick Co., Clearfield, Pa.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.
Stowe, Fuller & Co., Cleveland, O.
Dover Fire Brick Co., Cleveland.
F. B. Stevens, Detroit, Mich

Fire Pails—
Thos. J. Bell & Co., Cincinnati, O.

Fire Proof Covering—
Keasbey & Mattison Co., Ambler, Pa.
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Flue Scrapers—
Ed. Wertheim, Chicago.

Foot and Power Lathes—
Prentiss Tool & Supply Co., Chicago, Ill.
W. F. & John Barnes Co., Rockford, Ill.
Hill, Clarke & Co., Chicago, Ill.
Lodge & Shipley Machine Tool Co., Cincinnati.
George Place Machine Co., New York City.

Foundries—
The Lloyd-Booth Co., Youngstown, O.
Taylor & Boggis Foundry Co., Cleveland, O
Wm. Tod & Co., Youngstown, O.
S. Freeman & Sons Mfg. Co., Racine, Wis.
Vulcan Iron Works Co., Toledo, O.
Kurtz & Buhrer Foundry Co., Chicago, Ill.
The Hooven, Owens & Rentschler Co.
Fulton Steam Boiler Wks. & Fdy., Richmond, Ind.
W. A. Jones Foundry Co., Chicago.

Foundry Supplies—
American Fire Brick & Clay Co., Mineral Point, Ohio.
Clearfield Fire Brick Co., Clearfield, Pa.
Millett Core Oven Co., Brightwood, Mass.
Ohio Sand Co., Conneaut, O.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.
Tabor Mfg. Co., New York City.
Chicago Chemical Solution Co., Chicago, Ill.
F. B. Stevens, Detroit, Mich.
Craig Ridgway & Son, Coatesville, Pa.
H. W. Knight & Son, Seneca Falls, N. Y.

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Cleveland City Forge & Iron Co., Cleveland.

Furnace Linings—
Union Mining Co., Mt. Savage, Md.
American Fire Brick & Clay Co., Mineral Point, Ohio.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.

Fuel Oil Burners—
Thurman Fuel Oil Burner Co., Indianapolis, Ind
Burns Hydro-Carbon Burner Co., Fort Plain, N. Y.

Galvanizers—
H. H. Hodell & Co., Cleveland.

Grindstones—
C. H. Besly & Co., Chicago, Ill.

Graphite Paint—
Jos. Dixon Crucible Co., Jersey City N. J.,

Heaters and Purifiers—
Stilwell & Bierce Manufacturing Co., Dayton, O.
Warren, Webster & Co., Camden, N. J.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

Heavy Hardware—
E. K. Morris & Co., Cincinnati, O.
C. H. Besly & Co., Chicago, Ill.

Hoisting and Conveying Machinery—
C. W. Hunt Co., New York City.
Pen Argyl Iron Works, Pen Argyl, Pa.
W. A. Crook & Bro's Co., Newark, N. J.
American Hoist & Derrick Co., St. Paul Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

Hoisting Blocks—
Moore Mfg. & Foundry Co., Milwaukee, Wis.
American Hoist & Derrick Co., St. Paul, Minn.

Hoisting Engines—
The John F. Byers Machine Co., Ravenna, O.
C. W. Hunt Co., New York City.
Pen Argyl Iron Works, Pen Argyl, Pa.
Vulcan Iron Works Co., Toledo, O.
W. A. Crook & Bro's Co., Newark, N. J.
The Edward P. Allis Co., Milwaukee, Wis.
American Hoist & Derrick Co., St. Paul, Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

Hot Water Heaters—
United States Heater Co., Detroit, Mich.

House Heaters—
United States Heater Co., Detroit, Mich.

Injectors—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Insurance Companies—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

Iron Buildings—
Shiffler Bridge Co., Pittsburg, Pa.

Iron Nails and Steel—
Weber & Co., Cincinnati, O.
Bethlehem Iron Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill.

Iron and Steel Roofing—
Sykes Iron & Steel Roofing Co., Niles, O.
Berger Mfg. Co., Canton, O.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

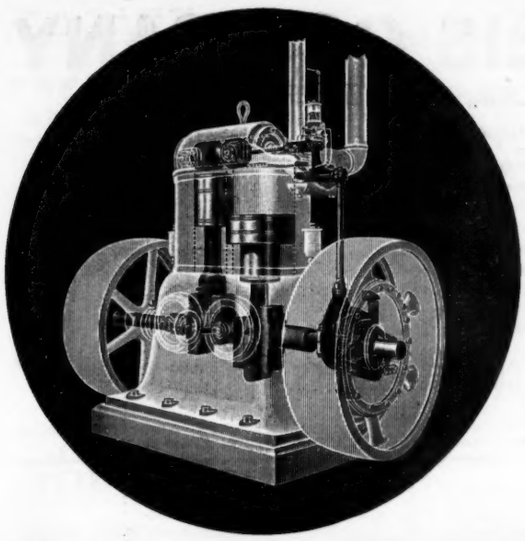
Iron Ore, Bar and Pig Iron—
Oglebay, Norton & Co., Cleveland.
Condit-Fuller Co., Cleveland.
E. C. Pope, Cleveland.
Forster, Hawes & Co., Chicago, Ill.

Iron Working Tools—
Cleveland Twist Drill Co., Cleveland, O.
Prentiss Tool & Supply Co., Chicago, Ill.
Toledo Machine & Tool Co., Toledo, O.
W. F. & John Barnes Co., Rockford, Ill.
H. Bickford, Lakeport, N. H
Hill, Clarke & Co., Chicago, Ill.
Fox Machine Co., Grand Rapids, Mich.
Lodge & Shipley Machine Tool Co., Cincinnati.
Machinists' Supply Co., Chicago.
C. H. Besly & Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Willis Shaw, 416 N. Y. Life B'dg., Chicago.
George Place Machine Co., New York City.

Link Belting—
The Jeffrey Mfg. Co., Columbus, O.

Lathes—
Prentiss Tool & Supply Co., Chicago, Ill.
W. F. & John Barnes Co., Rockford, Ill.
Hill, Clarke & Co., Chicago, Ill.
Lodge & Shipley Machine Tool Co., Cincinnati.
George Place Machine Co., New York City.

Machinists' Tools and Supplies—
Prentiss Tool & Supply Co., Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O
W. F. & John Barnes Co., Rockford, Ill.
H. Bickford, Lakeport, N. H.
Hill, Clarke & Co., Chicago, Ill.
Fox Machine Co., Grand Rapids, Mich.
Ed. Wertheim, Chicago.
Machinists' Supply Co., Chicago.
Gouverneur Machine Co., Gouverneur, N. Y.
C. H. Besly & Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
George Place Machine Co., New York City.



ECONOMICAL RESULTS IN CUBA.

HAVANA, CUBA, May 18th, 1895.

The Westinghouse Machine Co., Pittsburg, Pa., U. S. A.:

GENTLEMEN: We began running the large (23" and 40" x 20" 600 H. P.)

WESTINGHOUSE COMPOUND ENGINE,

and the 250 K. W. dynamo last Monday. Everything went off all right the first time and has since been running perfectly, making a saving of **over 4,000 pounds of coal each night**, over and above what we were using with the ——— engines.

We have been able to shut down three boilers, and do not have to force the remaining ones at all.

The whole story is told in one word, "Perfection."

Yours truly,

SPANISH-AMERICAN LIGHT & POWER CO

(Signed F. H. Thompson.)

THE WESTINGHOUSE MACHINE CO., PITTSBURG, PA., U. S. A.

Machine Screws—
Illinois Screw Co., Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.

Machine Shops—
Toledo Machine & Tool Co., Toledo, O.
Harn, Ow & Co., Beaver Falls, Pa.

Magnesia Covering—
Keasbey & Mattison Co., Ambler, Pa.
C. H. Besly & Co., Chicago, Ill.

Mechanical Engineers—
John Fraser, Chicago, Ill.

Metal Saws—
Q. & C. Co., Chicago, Ill.

Mining Engineers—
Richard A. Parker, Marquette, Mich.

Milling Machines—
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Hill, Clarke & Co., Chicago, Ill.
Lodge & Shipley Machine Tool Co., Cincinnati.
George Place Machine Co., New York City.

Mining Machinery—
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
C. W. Hunt Co., New York City.
Pen Argyl Iron Works, Pen Argyl, Pa.
Vulcan Iron Works Co., Toledo, O.
C. H. Besly & Co., Chicago, Ill.
W. A. Crook & Bro's Co., Newark, N. J.
The Edward P. Allis Co., Milwaukee, Wis.
American Hoist & Derrick Co., St. Paul, Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

Moulding Sand—
Ohio Sand Co., Conneaut, O.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.

Nickel—
Canadian Copper Co., Cleveland, O.

Oil Cups—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Oil Pumps—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Ore Crushers—
The Edward P. Allis Co., Milwaukee, Wis.
American Hoist & Derrick Co., St. Paul, Minn.

Packing—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Paint—
Iron Clad Paint Co., Cleveland.
Jos. Dixon Crucible Co., Jersey City, N. J.
Empire Paint & Roofing Co, Philadelphia, Pa.

Pattern Letters—
H. W. Knight & Son, Seneca Falls, N. Y.

Pattern Makers—
Milwaukee Fdy. Supply Co., Milwaukee, Wis.

Perforated Sheet Metal—
Harrington & King Perforating Co., Chicago, Ill
Aitchison Perforated Metal Co., Chicago.
Hendrick Mfg. Co. Ltd., Carbondale, Pa

Pipe Covering—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Planers—
Prentiss Tool & Supply Co., Chicago, Ill.
Hill, Clarke & Co., Chicago, Ill.
Lodge & Shipley Machine Tool Co., Cincinnati.
George Place Machine Co., New York City.

Plumbers' and Gas Fitters' Supplies—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Portable Core Ovens—
Millett Core Oven Co., Brightwood, Mass.

Portable Forges—
Buffalo Forge Co., Buffalo, N. Y.
Cady Mfg. Co., Cleveland, O.
C. H. Besly & Co., Chicago, Ill.
B. F. Sturtevant Co., Boston, Mass.

Presses—
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Cady Mfg. Co., Cleveland, O.
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
C. H. Besly & Co., Chicago, Ill.

Pulleys—
W. A. Jones Foundry Co., Chicago, Ill.

Pulley Blocks—
Moore Mfg. & Foundry Co., Milwaukee, Wis.
American Hoist & Derrick Co., St. Paul, Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

Pumps—
Ed. Wertheim, Chicago.
Deming Co., Salem, O.
The Edward P. Allis Co., Milwaukee, Wis.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

Pumps (Steam)—
Brightman Stoker Co., Cleveland, O.
Ed. Wertheim, Chicago.

Pyrometers—
Edward Brown, Philadelphia, Pa

Railway Supplies—
Cleveland City Forge & Iron Co., Cleveland.
Ed. Wertheim, Chicago.

Rock Breakers—
American Hoist & Derrick Co., St. Paul, Minn.

Rolling Mill Machinery—
The Lloyd-Booth Co., Youngstown, O.
Totten & Hogg I. & S. F'dry Co., Pittsburg, Pa.

Roofing (felt)—
Consolidated Roofing Works, Columbus, O.
Empire Paint & Roofing Co., Philadelphia, Pa.

Sand and Chill Rolls—
The Lloyd-Booth Co., Youngstown, O.

Saws—
Peter Gerlach & Co., Cleveland.

Schools—
Michigan Mining School, Houghton, Mich.

Screens for Coal Ore, Etc.
Robt. Aitchison Perforated Metal Co., Chicago.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Ltd., Carbondale, Pa.

Scrap Iron & Steel—
Klein & Cohn, Cincinnati, O.

Screws—
Illinois Screw Co., Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.

Second-Hand Machinery—
Prentiss Tool & Supply Co., Chicago, Ill.
Hill, Clarke & Co., Chicago, Ill.
George Place Machine Co., New York City.

Shearing and Punching Machinery—
Bertsch & Co., Cambridge City, Ind.
Toledo Machine & Tool Co., Toledo, O.
Cady Mfg. Co., Cleveland, O.
Fox Machine Co., Grand Rapids, Mich.
Long & Allstatter Co., Hamilton, O.

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland.
Berger Bros., Philadelphia, Pa.

Special Machinery—
Toledo Machine & Tool Co., Toledo, O.
Cady Mfg. Co., Cleveland, O.
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
Lodge & Shipley Machine Tool Co., Cincinnati.

Split Collars—
Gouverneur Machine Co., Gouverneur, N. Y.

Stamping and Punching—
Cady Mfg. Co., Cleveland, O.

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Steam Pipe and Boiler Covering—
Keasbey & Mattison Co., Ambler, Pa.
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago Ill

Steam Packing—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Steam Shovels and Dredges—
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
Vulcan Iron Works Co., Toledo, O.

Steam Specialties—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.

Steel Castings—
Wm. Jessop & Sons, Ltd., New York, N. Y.

Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland.
Bethlehem Iron Co., South Bethlehem, Pa.

Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.

Tanks—
S. Freeman & Sons Mfg. Co., Racine, Wis.
Enterprise Boiler Co., Youngstown, O.

Telephones—
Union Electric Co., Cleveland, O.

Tinning Machinery—
The Lloyd-Booth Co., Youngstown, O.

Tin Plate—
Gummey, Spering & Co., Philadelphia, Pa.

Tool Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.
C. H. Besly & Co., Chicago, Ill.

Tube Welding—
S. Fix Sons, Cleveland.

Twist Drills—
Cleveland Twist Drill Co., Cleveland.
C. H. Besly & Co., Chicago, Ill.
Machinists' Supply Co., Chicago.

Valves—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

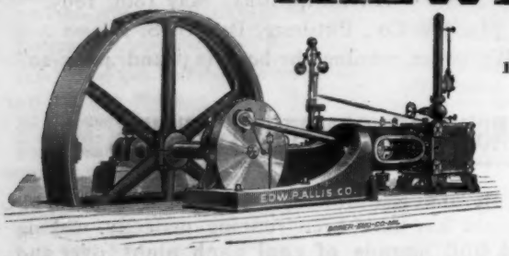
Wheel Barrows—
Akron Cultivator Co., Akron, O.

Wire Nails—
Salem Wire Nail Co., Salem, O.

Wire Rope—
W. A. Crook & Bro's Co., Newark, N. J.
C. W. Hunt Co., New York City.
George Cradock & Co., Chicago, Ill.
American Hoist & Derrick Co, St. Paul, Minn

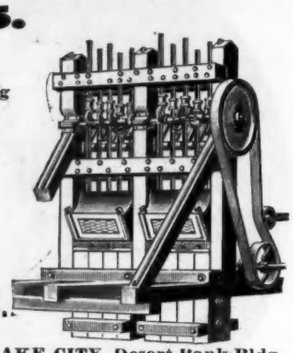
Wire Machinery—
Cady Mfg. Co., Cleveland, O.

THE EDWARD P. ALLIS COMPANY
MILWAUKEE, WIS.



MANUFACTURERS OF

Blowing Engines, Hoisting Engines, Pumping Engines, Air Compressors, Special Engines for Electric Lighting, Street Railways and Rolling Mills, Ore Crushers, Crushing Rolls, Stamp Mills, Concentrators, General Mining, Milling and Smelting Machinery.



REYNOLDS PATENT VERTICAL BOILERS. REYNOLDS CORLISS ENGINES.

NEW YORK, Room 1111, Havemeyer Bldg.
CHICAGO, Room 509, Home Ins. Bldg.
MINNEAPOLIS, Room 416, Corn Exchange.
DENVER, 1316 18th Street.
SAN FRANCISCO, 31 Main Street.
PITTSBURG, 702 German Nat'l Bank Bldg.
SALT LAKE CITY, Desert Bank Bldg.,
KANSAS CITY, Armour Bldg.

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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Ohio Sand Co.	32
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Tanite Co.	32
Taylor & Boggis Foundry Co.	1
Thurman Fuel Oil Burner Co.	18
Tod, Wm. & Co.	30
Toledo Machine & Tool Co.	31
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Union Electric Co.	31
Union Mining Co.	16
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Vulcan Iron Works	17
Warren, Webster & Co.	31
Wertheim, Ed.	1
Westinghouse Machine Co.	25
Westmoreland Fire Brick Co.	27
Wheeler Boiler Co.	30

Our teamster says "This must be —— good stuff, for we ship it all over God's green earth, from H—— to Hackensack." He is right about it being "good stuff," for it will clean your castings of sand or scale, leaving them perfectly clean for plating, tinning, enamelling, galvanizing, etc., etc.

Chicago Chemical Solution Mfg. Co.

41 Lakeside Bldg., CHICAGO, ILL.

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No. 1 Bessemer hematite	2.90@ 3.0
Hematites No. 1 non-Bessemer	2.00@ 2.2
No 1. Specular, non-Bessemer	2.35@ 2.7

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$13 00@$13 25
No. 1 Strong Foundry	12 50@ 12 75
No. 2 Strong Foundry	12 00@ 12 25
No. 1 Gray Forge, red short	10 75@ 11 00
No. 2 Gray Forge, neutral	10 50@ 00 00
No. 1 American Scotch	00 00@ 12 65
No. 2 American Scotch	00 00@ 12 15
Lake Superior Charcoal	13 00@ 13 50
PITTSBURG:	
No. 1 Foundry	$12 50@$12 75
No. 2 Foundry	11 75@ 12 00
Gray Forge	10 50@ 10 90
White and Mottled	10 25@ 10 50
Warm Blast Charcoal	16 00@ 17 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	13 00@ 13 25
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$13 25@$13 75
Local Coke Foundry No. 1	12 00@ 12 25
Local Coke Foundry No. 2	11 50@ 11 75
Local Coke Foundry No. 3	11 00@ 11 25
Local Scotch Foundry No. 1	12 00@ 12 25
Local Scotch Foundry No. 2	11 50@ 11 75
Local Scotch Foundry No. 3	11 00@ 11 25
Southern Coke No. 1	10 70@ 11 00
Southern Coke No. 2	12 50@ 12 75
Southern Coke No. 3	12 25@ 12 50
Southern No. 1 Soft	12 50@ 12 75
Southern No. 2 Soft	12 25@ 12 50
Southern Silveries No. 1	13 75@ 14 00
Southern Silveries No. 2	13 25@ 13 50
Jackson Co. Silveries	15 00@ 16 00
Ohio Silveries No. 1	14 00@ 14 50
Ohio Silveries No. 2	13 00@ 13 50
Ohio Strong Softeners	13 00@ 13 50
Alabama Car Wheel	16 50@ 17 00
Malleable Bessemer	12 00@ 12 50
Coke Bessemer	12 00@ 12 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$12 00@$00 00
Southern Coke No. 2 and No. 1 Soft	11 50@ 00 00
Hanging Rock Coke, No 1	12 00@ 12 25
Hanging Rock Charcoal No. 1, Fdy	15 00@ 16 50
Tennessee Charcoal No 1	13 00@ 14 50
Jackson County Stone Coal No 1	14 00@ 14 50
Southern Coke, Gray Forge	11 00
" " Mottled	11 00@ 00 00
Standard Alabama Car Wheel	15 00@ 16 00
Tennessee " "	14 50@ 15 00
Lake Superior " "	13 50@ 14 00

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	GROSS TONS
Old iron rails	$14 50
Old steel rails	11 50
	NET TONS
No. 1 R. R. wrought scrap	$12 00
No. 1 wrought scrap	11 00
No. 1 Machine cast scrap	9 50
Iron axles	16 50
Axle turnings	8 50
Wrought turnings (free from cast)	8 00
Cast borings	7 00
Uncut wrought iron boilers	5 00
Steel boiler plates	9 50
Grate bars	6 50
Pipes and flues (clean)	8 00
Tank iron	8 75
Hoop and band iron	7 00
Sheet iron	7 00
Wrought drillings	8 00
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.40c@1.45c
Angles	1.30c@1.35c
Tees	1.45c@1.50c
Universal Plates	1.35c
Sheared Plates	1.45c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 25
4¼ to 6 by ⅜ to 1 inch	1 30
1¾ to 6 by 1⅛ to 2 inch	1 45
1¼ & 1¾ by ⅜ to ¾ inch	1 30
1 & 1¼ by ¾ to ¾ inch	1 35
⅝, ¾, ⅞, by ¾ to 1½ inch	1 45

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.

THE CADY MFG. CO.

18, 20 and 22 Johnson St., CLEVELAND, O.

SEND FOR OUR NEW CATALOGUE OF Power Presses, Drop Hammers, Punches and Shears, Wire Working and Special Machinery.

PERFORATED METALS

OF ALL KINDS FOR

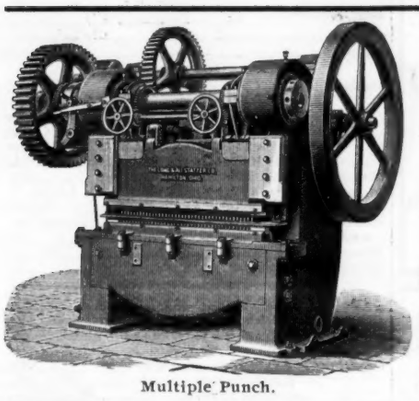
MILLING MINING AND AGRICULTURAL MACHINERY,

PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.

LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.

THE ROBERT AITCHISON. PERFORATED METAL CO.,

OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.



Multiple Punch.

—THE—

Long & Allstatter Co.

HAMILTON, O., U. S. A.

Manufacturers of Belt, Steam and Electrically driven

Power Punches and Shears,

for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc. Send for catalogue.

A. H. LEITCH, PREST. JOHN C. LEITCH, SEC. AND TREAS.

WESTMORELAND FIRE BRICK CO.

MANUFACTURERS OF HIGH GRADE **FIRE BRICKS.**

PITTSBURG, PA.

Works and Mines, Westmoreland, Pa.

DIXON'S GRAPHITE PAINT

FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL.

Tin roofs well painted have not required repainting for 10 to 15 years.

If you need any paint it will pay you to send for circular.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,

CLEVELAND, OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE

Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅞ inch	1 25
2 to 2⅝ inch	1 45
2¾ to 3¼ inch	1 40
3⅜ to 4 inch	1 75
4⅛ to 4½ inch	2 35
4¾ to 5 inch	2 55

Oval.

⅞ to 1¼ inch	1 45
⅜ to ¾ inch	1 45
½	1 65
⅝	1 85

Half Oval and Half Round.

1⅛ to 3 inch	1 80
⅞ to 1⅛ inch	1 60
⅜ to ¾ inch	1 85
½	2 00
⅝	3 10

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 35
1 to 1⅜ by ¼ and 5-16 inch	1 40
⅛ to ⅞ by ¼ and 5-16 inch	1 50
½ to ⅝ by ¼ and 5-16 inch	1 75

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 80
1 7-16 to 2, No. 17, 18 and 19	1 85
1 7-16 to 2, No. 20	1 95
1 7-16 to 2, No. 21	2 05
1 7-16 to 2, No. 22	2 15
1⅛ to 1⅜, No. 13, 14 and 15	1 85
1⅛ to 1⅜, No. 16, 17 and 18	1 90
1⅛ to 1⅜, No 19 and 20	1 95
1⅛ to 1⅜, No. 21	2 05
1⅛ to 1⅜, No. 22	2 15
15-16 and 1 inch, No. 13, 14 and 15	1 80
15-16 and 1 inch, No. 16, 17 and 18	1 95
15-16 and 1 inch, No. 19 and 20	2 05
15-16 and 1 inch, No. 21	2 15
15-16 and 1 inch, No. 22	2 25
⅞, No. 13, 14 and 15	2 05
⅞, No. 16. 17 and 18	2 15
⅞, No. 19 and 20	2 25
⅞, No. 21	2 35
⅞, No. 22	2 45
13-16, No. 13, 14 and 15	2 15
13-16, No. 16, 17 and 18	2 25
13-16, No. 19 and 20	2 35
13-16, No. 21	2 45
13-16, No. 22	2 55
¾, No. 13, 14 and 15	2 25
¾, No. 16, 17 and 18	2 40
¾, No. 19 and 20	2 50
¾, No. 21	2 60
¾, No. 22	2 70
11-16, No. 13, 14 and 15	2 50
11-16, No. 16, 17 and 18	2 55
11-16, No. 19 and 20	2 65
1-16, No. 21	2 75
11-16, No. 22	2 85
11-16, No. 23	2 95
⅝, No. 13, and 15	2 55
⅝, No. 16, 17 and 18	2 65
⅝, No. 19 and 20	2 75
⅝, No. 21	2 85
⅝, No. 22	2 95
⅝, No. 23	3 05
9-16, No. 13, 14 and 15	2 75
9-16, No. 16, 17 and 18	2 85
9-16, No. and 20	2 95
9-16, No. 21	3 05
9-16, No. 22	3 15
9-16, No. 23	3 25
7-16 and ½ inch, No. 13, 14 and 15	2 95
7-16 and ½ inch, No. 16, 17 and 18	3 05
7-16 and ½ inch, No. 19 and 20	3 15
7-16 and ½ inch, No. 21	3 25
7-16 and ½ inch, No. 22	3 35
7-16 and ½ inch, No. 23	3 45
⅜, No. 13, 14 and 15	3 45
⅜, No. 16, 17 and 18	3 55
⅜, No. 19 and 20	3 65
⅜, No. 21	4 96
⅜, No. 22	4 05
⅜, No. 23	4 20

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 55
1½ to 6 by Nos. 11 and 12	1 60
1 to 1⅜ by ⅛ to 3-16 inch	1 60
1 to 1⅜ by Nos. 11 and 12	1 65
⅞ and 13-16 by ⅛ to 3-16 inch	1 75
⅞ and 13-16 by Nos. 11 and 12	1 80
¾ and 11-16 by ⅛ to 3-16 inch	1 85
¾ and 11-16 by Nos. 11 and 12	1 90
⅝ and 9-16 by ⅛ to 3-16 inch	2 00
⅝ and 9-16 by Nos. 11 and 12	2 05
½ by ⅜ to 3-16 inch	2 15
¼ by Nos. 11 and 12	2 20

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 75
⅞ inch, " " " " 13 and 14	1 85
¾ inch, " " " " 11 and 12	1 90
¾ inch, " " " " 13 and 14	1 20

Sheet Iron.

No. 10	1 85
No. 12	1 95
No. 14	2 00
No. 15-17	2 10
No. 18	2 25
No. 20	2 40
No. 22-24	2 50
No. 25.26	2 60
No. 27	2 70

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 65
Shell	1 85
Flange	1 95
Marine Flange	2 25
Fire Box	3 15

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½

JESSOP'S STEEL —FOR— **Tools, Drills, Dies, etc.**

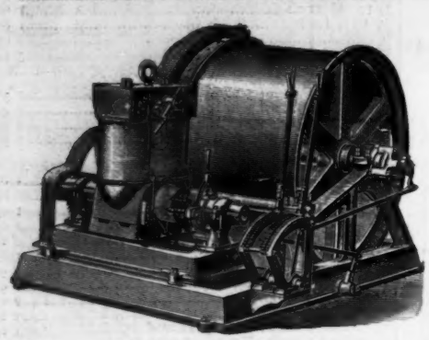
Established over a Century ago. Manufactory, SHEFFIELD, ENGLAND.

CHIEF AMERICAN OFFICE, 91 JOHN ST., NEW YORK.

WM. JESSOP & SONS, Limited.

"Medal—World's Columbian Exposition, 1893."

All sizes carried in stock by The W. Bingham Co., Cleveland, Ohio.



HOISTING MACHINERY for Mining, Quarrying, Coal Handling, Pile Driving, Bridge Building, Log Hauling and for general Contractors' Use. Improved Electric Hoists, single and double Patent Friction Drum, compound, geared with brakes and reversible for general Hoisting. Mining Purposes and Suspension Cable Ways.

Send for Illustrated Catalogue giving full description, etc. 1

CORRESPONDENCE SOLICITED.

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117-123 Pioneer St.,

Salesrooms, 143 Liberty St., N. Y. Newark, N. J.

C. W. HUNT COMPANY,

45 Broadway, New York,

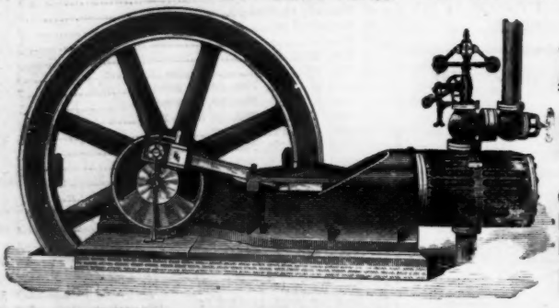
MANUFACTURERS OF

Engineers' and Contractors' MACHINERY

For Hoisting and Conveying Purposes.

SECTIONAL TRACK, INDUSTRIAL AND CABLE RAILWAYS.
BARROWS, COAL BUCKETS, WIRE ROPE, TIP CARS, ETC 2

TOTTEN & HOGG I. & S. F'DRY CO.



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The "Ætna" Rolling Mill **ENGINE,**

Chilled and Sand Rolls and Rolling Mill Machinery.

Pittsburg Pa

FIRE DOVER FIRE BRICK CO., MANUFACTURERS OF Furnace, Mill and Special Shape Fire Brick Office, 44 Mercantile Bank Bldg., CLEVELAND, OHIO. **BRICK**

All the Pinkertons in the land could not detect a flaw in our....

OUR . . PRICES ARE . . JUST . RIGHT.

"O.K." CROWN

High grade Fire Brick, because they are made from the BEST material by SKILLED and EXPERIENCED Workmen. They are WARRANTED to give satisfactory service.

OAK HILL FIRE BRICK AND COAL CO. Manufacturers

.....OAK HILL, OHIO

Subscribe for THE IRON TRADE REVIEW, $3.00 per year

7-16 to ⅜ and 2⅜ to 3 in.	09
3⅛ to 4 in.	09½
⅝ to 11-16 and 4⅛	10
½ to 6 in.	10½
⅝ to 9-32 and 6⅝ to 7 in.	11
[illegible] in	13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price, 1 60
Tire	" 1 70
Spring	" 2 20
Sleigh Shoe	" 2 10
Toe Calk	" 2 15
Cutter Shoes, tapered and bent	" 2 20

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base	dis. 70, 10 and 10
Butt " " "	dis. 62, 10 and 10
Lap " galv. "	dis. 60, 10 and 10
Butt " " "	dis. 57, 10 and 10
Boiler tubes 2¼" and smaller,	dis 67½ and 5
Boiler tubes 2½" and larger	dis. 70 and 5
Casing screw and socket joint	dis. 55
Casing inserted joint	dis. 50

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths' Hill's	dis 40
Blacksmiths' Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 4[illegible]
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 35
Horton's Universal	dis40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe. Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1⅛"	dis 50&10
Morse Taper and Straight Shank Larger than 1⅛"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 46 gr.	No. 54 to 150 gr.	Flour, C. F. F. FF.
Kegs, ₩ lb	4½c	5 c	2½c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

SHIFFLER BRIDGE COMPANY,

BUILDING DEPARTMENT.

SPECIALTIES: STEEL AND IRON BUILDINGS FOR ROLLING MILLS, TIN PLATE PLANTS, STEEL WORKS, FOUNDRIES, FACTORIES, ROOF TRUSSES, GIRDERS, COLUMNS, BEAMS, CORRUGATED IRON, ETC.

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FOR YOUR OUTING GO TO PICTURESQUE MACKINAC ISLAND.

ONE THOUSAND MILES OF LAKE RIDE AT SMALL EXPENSE.

Visit this Historical Island, which is the grandest summer resort on the Great Lakes. It only costs about $13 from Detroit; $15 from Toledo; $18 from Cleveland, for the round trip, including meals and berths. Avoid the heat and dust by traveling on the D. & C. floating palaces. The attractions of a trip to the Mackinac region are unsurpassed. The island itself is a grand romantic spot, its climate most invigorating. Two new steel passenger steamers have just been built for the upper lake route, costing $300,000 each. They are equipped with every modern convenience, annunciators, bath rooms, etc., illuminated throughout by electricity, and are guaranteed to be the grandest, largest and safest steamers on fresh water. These steamers favorably compare with the great ocean liners in construction and speed. Four trips per week between Toledo, Detroit, Alpena, Mackinac, St. Ignace, Petoskey, Chicago, "Soo," Marquette and Duluth. Daily between Cleveland and Detroit, and Cleveland and Put-in-Bay. The palatial equipment makes traveling on these steamers thoroughly enjoyable. Send for illustrated descriptive pamphlet. Address A. A. SCHANTZ, G. P. A., D. & C., Detroit, Mich

Cleveland Union Station.

Pennsylvania Lines.

Foot of Bank Street.

TICKET OFFICES at Station, Euclid Av., Woodland Av., and Weddell House corner.

THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 a m
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	†2:45 pm	†12:10 pm
Akron and Orrville	† 3:25 pm	† 9:50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

Valley Ry.

Depot foot of So Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations.	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	†11:00 A M
Wooster	.....	†6:30 P M
Akron, Canton & Marietta	†2:45 P M	†11:00 A M
Steubenville, Wheeling, Washington, D. C., and Baltimore	†2:45 P M	†11:00 A M

†Daily except Sunday. *Daily. Pullman's Palace Vestibule Drawing Room cars between Cleveland and Chicago.

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ELECTROTYPE
ENGRAVING CO.
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COMMISSION DEALER IN

Iron Ore, Pig Iron AND METALS.

Cleveland - Ohio.

ESTABLISHED 1854.

PETER GERLACH & CO.,

MAKERS OF

Saws, Tools and Machinery.

Office and Warerooms, 28 Columbus St.
Factories on Columbus, Winter and Leonard Sts.,
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THE CONDIT-FULLER CO.,

Pig and Bar Iron,

CLEVELAND, . OHIO.

Oglebay, Norton & Co.,

LAKE SUPERIOR IRON ORES.

— AGENTS —

The Spanish-American Iron Co.,
Santiago, Cuba.

CLEVELAND. PHILADELPHIA.

$2.50 CLEVELAND TO BUFFALO

Via "C. & B. LINE,"

Commencing with opening of navigation (about April 1st). Magnificent side-wheel steel steamers

"State of Ohio" and "State of New York."

DAILY TIME TABLE.

SUNDAY INCLUDED.

Lv. Cleveland, 6:00 P.M. | Lv. Buffalo, 6:30 P.M.
Ar. Buffalo, 7:30 A.M. | Ar. Cleveland, 7:30 A.M.

CENTRAL STANDARD TIME.

Take the "C. & B. Line" steamers and enjoy a refreshing night's rest when enroute to **Buffalo, Niagara Falls, Toronto, New York, Boston, Albany, 1,000 Islands,** or any Eastern or Canadian point.

Cheap Excursions Weekly to Niagara Falls.

Send 4 cents postage for tourist pamphlet.

W. F. HERMAN, Gen'l Pass. Agt. **T. F. NEWMAN,** Gen'l Manager.
Cleveland, O.

CHICAGO HEIGHTS

The Industrial Centre of Chicago

offers **Free Factory Sites** and other inducements.

If you are seeking a new location it will pay you well to investigate the merits of our proposition.

Chicago Heights Land Association
M. H. KILGALLEN, Gen'l Mgr. CHICAGO

CHICAGO HEIGHTS

The Industrial Centre of Chicago

offers **Free Factory Sites** and other inducements.

If you are seeking a new location it will pay you well to investigate the merits of our proposition.

Chicago Heights Land Association
M. H. KILGALLEN, Gen'l Mgr. CHICAGO

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F.	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 60@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3¼
Hexagon	15½	11½	8½	6	5½	5¼	
Washers	9	8	7	5	4½	4¼	4¼

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ₩ keg card rate	
{ Car lots	$1.55
{ Less than car lots	$1.65

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz	dis 10@10&10

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block	dis 20

Rivets.

Iron, Thousand, list November 1, 1894	dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894	dis 60@65
Copper	dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

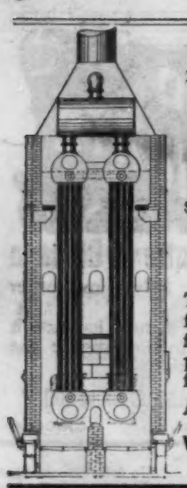
Wire.

New List, Apr. 9, 1894

Brass	dis 40
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75&5
" " Nos. 27@36	dis 75&10&5
Coppered Nos. 0 to 18, market list	dis 70@70&5
Galvanized Nos. 0 to 18 " "	dis 65&5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10&5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis



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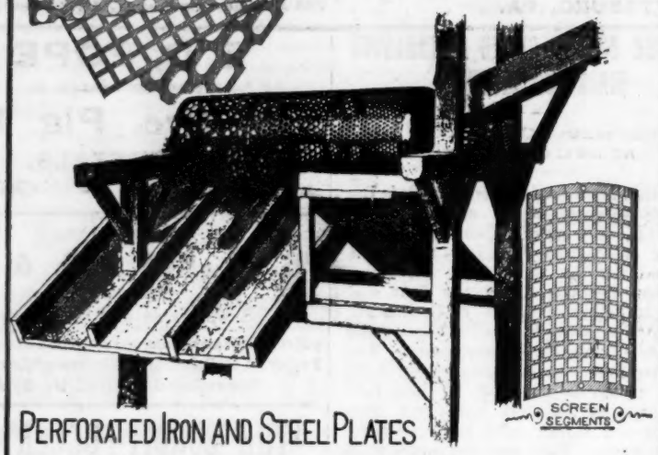

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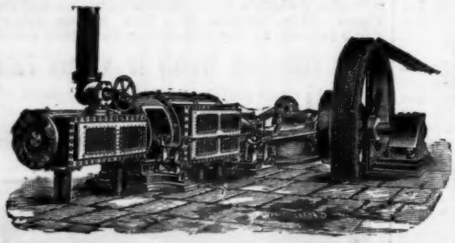

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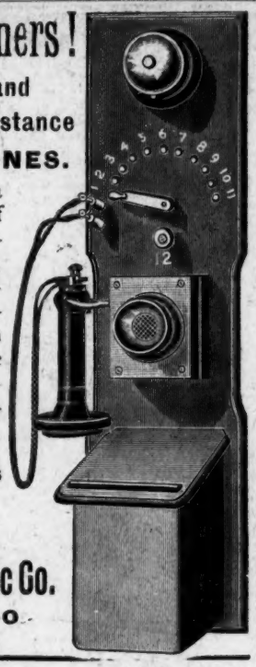

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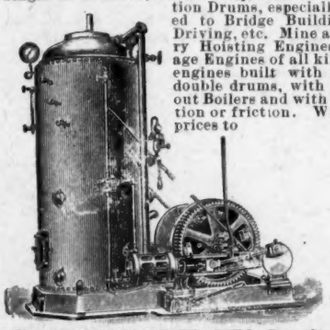

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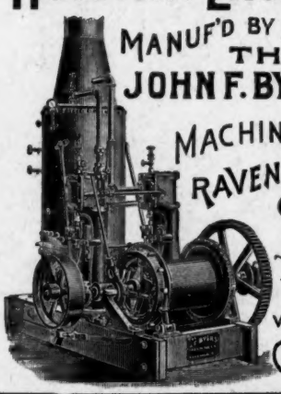

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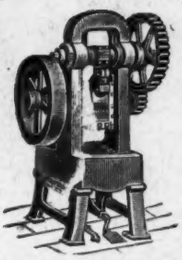

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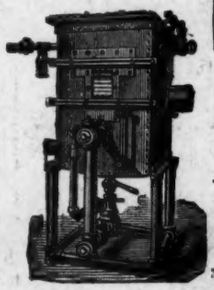

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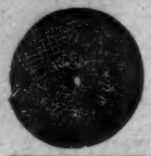

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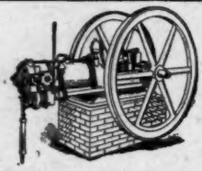

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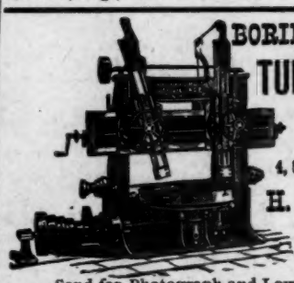

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